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In the Supreme Court of the United States

OCTOBER TERM, 1957

No. ——

THE UNITED STATES, PETITIONER

v.

FEHLHABER CORPORATION

PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF CLAIMS

The Solicitor General, on behalf of the United States, prays that a writ of certiorari issue to review the judgment of the Court of Claims entered in the above case on June 5, 1957.

OPINION BELOW

The opinion of the Court of Claims (App., *infra*, pp. 14–28) is reported at 151 F. Supp. 817.

JURISDICTION

The judgment of the Court of Claims was entered on June 5, 1957 (App. 28). On August 27, 1957, Mr. Justice Black extended the time for filing a petition for certiorari to and including September 18, 1957. The jurisdiction of this Court is invoked under 28 U. S. C. 1255 (1).

QUESTION PRESENTED

Whether, where a contractor had specifically agreed that the administrative decision on a factual dispute arising out of a Government contract was to be "final and conclusive" and the Act of May 11, 1954, similarly provides that "such decision shall be final and conclusive unless * * * not supported by substantial evidence," the Court of Claims may upset such a decision without regard to the substantiating evidence before the administrative authority and solely on the basis of the evidence presented to that court.

STATUTORY AND CONTRACT PROVISIONS INVOLVED

1. The Act of May 11, 1954, 68 Stat. 81 (Wunderlich Statute) (41 U. S. C., Supp. IV, 321–322) provides:

> § 321. Limitation on pleading contract-provisions relating to finality; standards of review
>
> No provision of any contract entered into by the United States, relating to the finality or conclusiveness of any decision of the head of any department or agency or his duly authorized representative or board in a dispute involving a question arising under such contract, shall be pleaded in any suit now filed or to be filed as limiting judicial review of any such decision to cases where fraud by such official or his said representative or board is alleged: *Provided, however,* That any such decision shall be final and conclusive unless the same is fraudulent or capricious or arbitrary or so grossly erroneous as necessarily to imply bad faith, or is not supported by substantial evidence.

§ 322. Contract-provisions making decisions final on questions of law

No Government contract shall contain a provision making final on a question of law the decision of any administrative official, representative, or board.

2. The "Disputes" or "Finality-Clause" Article of the contract here involved provides (App. *infra*, p. 33):

> *Disputes.*—Except as otherwise specifically provided in this contract, all disputes concerning questions of fact arising under this contract shall be decided by the Contracting Officer subject to written appeal by the Contractor within 30 days to the Head of the Department concerned or his duly authorized representative whose decision shall be final and conclusive upon the parties hereto. In the meantime the Contractor shall diligently proceed with the work as directed.

STATEMENT

This action arises out of the respondent's claim for certain unanticipated costs allegedly incurred by it in performance of a government contract. The Court of Claims' findings disclose the following pertinent facts:

In May 1946, the respondent entered into a contract with the United States for the building of a substructure for a bridge over the Chesapeake and Delaware Canal at Chesapeake City, Maryland (App. 28, 32). For this work the total contract price agreed to by both parties was $1,134,887 (App. 32).

The present action concerns a claim by the re-

spondent for an additional sum of $78,240, representing unanticipated expenditures allegedly incurred as a result of subsurface conditions which were encountered during operations under the contract and which were alleged to be materially different from those described in the contract drawings and specifications. On December 3, 1947, the contracting officer denied the respondent's claim (App. 18). It was then forwarded to the district engineer, the contracting officer's superior, who, on March 1, 1948, prepared and transmitted to the respondent detailed "findings of fact denying changed conditions relief" (App. 18, 75–81).

The respondent appealed under the "Disputes" Article of the contract (*supra*, p. 3) and was given a hearing by the Corps of Engineers Claims and Appeals Board (App. 81). At this hearing, the respondent presented its evidence and contentions at length.[1] In a written opinion dated February 15, 1949, the Board denied the respondent's claim (App. 19, 81–86). Ten days later, "the Chief of Engineers, who was the duly authorized appellate authority" under the contract, approved the Board's action (App. 81).

This action was then filed by the respondent in the court below. The government's "initial defense" was that the administrative denial was supported by substantial evidence when the "entire administrative

[1] The transcript of the entire proceedings before the Board—including the respondent's case and the government's case—contains over 175 typewritten pages. See Commissioner's Exhibit No. 1. In addition, there were several exhibits presented to the Board during the hearing.

record as a whole" was considered and that, pursuant to the so-called Wunderlich statute, *supra*, p. 2, the administrative decision was therefore final and conclusive on the parties (App. 19). However, the court below refused to review the administrative record to determine whether it contained adequate supporting evidence for the Board's decision (App. 19). Instead, after embarking upon a *de novo* hearing of the evidence, the court concluded that the evidence so adduced did not support the administrative decision. The administrative denial was accordingly set aside and judgment entered in favor of respondent (App. 28).

REASONS FOR GRANTING THE WRIT

The holding below, deliberately and expressly ignoring the administrative record on which the administrative decision was based and overturning it solely on the basis of evidence presented to the court at a *de novo* hearing, calls for review and reversal by this Court. The holding, which is applicable generally to government contract cases in the Court of Claims, flies in the face of (1) the explicit congressional admonition in the Act of May 11, 1954, that such administrative decisions shall be "final and conclusive" when "supported by substantial evidence", and (2) the Act's legislative history, which fully confirms what the text of the law shows. The ruling is also in direct conflict with decisions of other courts which have given proper effect to the congressional mandate. Moreover, the detrimental effect of the holding below on military and other govern-

mental procurement emphasizes the need for review and reversal here.[2]

1. Only three years ago, Congress, in the "Wunderlich statute," defined the scope of judicial review of administrative determinations of factual disputes under the "finality" clause of standard form government contracts. Act of May 11, 1954, *supra*, p. 2. In prescribing limited judicial review, the pertinent language unequivocally declares that the administrative "decision shall be final and conclusive unless * * * not supported by substantial evidence."[3] The "substantial evidence" referred to would certainly appear to mean the evidence developed in the record before the administrative agency. Thus, as has been held in other decisions under the Wunderlich statute, the reviewing court's function is exhausted when, "after careful consideration of the evidence before the Board," or other administrative agency, it becomes evident that the administrative conclusion has substantial support in the evidence.

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[2] In its opinion the Court of Claims stated that it was following its earlier decision in *Volentine and Littleton* v. *United States*, 145 F. Supp. 952. That opinion, which we believe to be erroneous also, was in support of the denial of the government's motion to dismiss and was therefore not in a posture to be reviewed on certiorari.

[3] In addition, under the statute, conclusive effect is not to be given any administrative determination which is "fraudulent or capricious or arbitrary or so grossly erroneous as necessarily to imply bad faith * * *." See *supra*, p. 2. This part of the statute is not involved here. The court below, in refusing to accord finality to the administrative decision, relied exclusively on an alleged lack of substantial evidence to support the decision.

Langoma Lumber Corp. v. *United States*, 140 F. Supp. 460 (E. D. Pa.), affirmed, 232 F. 2d 886 (C. A. 3).

The statute, in effect, reiterates the traditional rule of administrative finality. It is well settled that, under the "substantial evidence" rule, a reviewing court is precluded from embarking upon a reappraisal of the evidence presented to the agency. *Edison Co.* v. *Labor Board*, 305 U. S. 197, 229. If the evidence so presented reasonably supports the administrative decision, that decision must stand and cannot be displaced "even though the court would justifiably have made a different choice had the matter been before it *de novo*." *Universal Camera Corp.* v. *Labor Board*, 340 U. S. 474, 488; *O'Leary* v. *Brown-Pacific-Maxon*, 340 U. S. 504, 508–509. Plainly, if the court, after reviewing the administrative record, is barred from substituting its own conclusions for those of the agency, it follows that a court cannot substitute its own conclusions derived from a record entirely new and different from the one developed before the agency. The contrary view followed by the court below, by refusing to relate the decision of the department head to the record before him, impairs the weight which the statute expressly requires to be given to a decision made with the specialized knowledge of the government officials designated by the contracting parties. The result is that the administrative decision may be overturned, after a *de novo* trial, on the basis of evidence which was never laid before the administrators, or may be found "supported" by "substantial

evidence", which was likewise never considered when the initial decision was made.[4]

2. Nothing in the legislative history of the Wunderlich statute warrants the procedure employed below. On the contrary, it is clear that Congress meant what it said when it adopted the substantial evidence rule. The legislative history demonstrates that Congress considered and rejected proposals to expand the scope of review by substituting for the substantial evidence rule tests which would have accorded the reviewing court the broader latitude of a *de novo* review and which conceivably would thereby have furnished the Court of Claims with some justification for ignoring the administrative record.

Shortly after this Court, in *United States* v. *Wunderlich*, 342 U. S. 98, 100, held that "absent fraudulent conduct" the administrative decision on a government contract dispute "must stand under the plain meaning of the contract," a number of bills were introduced into Congress to permit judicial review in cases other than those involving fraud.[5] At the con-

[4] In the *Volentine* case, *supra*, 145 F. Supp. 952, 954, the Court of Claims refers to the procedural difficulties and delays arising from the two trials which it believes would be required by the government's position. But this fear is groundless. A second trial is no more necessary now than it was prior to the Wunderlich statute. If it is more convenient for the court, a commissioner may take all the evidence offered, but the court should not consider evidence outside the administrative record if that record provides "substantial" support for the departmental decision.

[5] S. 2432 and 2487, 82d Cong., 2d Sess.; H. R. 6214, 6301, and 6338, 82d Cong., 2d Sess.; S. 24, 83rd Cong., 1st Sess.; H. R. 1839 and 3634, 83rd Cong., 1st Sess.; H. R. 6946, 83rd Cong., 2d Sess.

gressional hearings, Congress was urged to pass one of the bills which contained no reference to the substantial evidence rule but which provided instead for "a *de novo* review." Hearings before a Subcommittee of the Senate Judiciary Committee on S. 2487, 82d Cong., 2d Sess., Feb. 15, 1952, at page 33. As already noted, such a bill, if passed, might have justified a review not based on the administrative evidence. In commenting on the insertion of a clause which would empower the reviewing courts to set aside the administrative decision only where it was arbitrary, capricious, or grossly erroneous or "not supported by substantial evidence," one of the witnesses testified (*id.* at p. 35):

> That is not in conformity with my recommendation that there should be a *de novo* review, but such language would, I think, adequately take care of the situation if the committee wanted to return to the state-of-the-law situation that existed prior to the Wunderlich decision and go no further.*

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*There is no doubt that Congress passed the Wunderlich statute in order to make certain that judicial review of an administrative decision under the disputes clause would not be limited to the sole ground of fraud but would also be available where the contractor establishes "arbitrariness and capriciousness." H. Rep. No. 1380, 83rd Cong., 2d Sess., p. 4. In this respect, Congress can be said simply to have codified the view many times reiterated by this Court, prior to its decision in *Wunderlich*, that the administrative resolution of a factual question under the disputes clause must be sustained unless it is capricious, so grossly erroneous as to necessarily imply bad faith, or fraudulent. See, *e. g.*, *Kihlberg* v. *United States*, 97 U. S. 398, 401, 402; *United States* v. *Gleason*, 175 U. S. 588, 602, 609; *Ripley* v. *United States*, 222 U. S. 144, 148; *United States* v. *Moorman*, 338 U. S. 457, 461. But these pre-*Wunderlich* decisions in no way justify the type of extraordinary

Congress, of course, did not want to go further. It accordingly rejected the *"de novo"* test, and the bill, as passed, imposes upon the reviewing court the limitations inherent in the substantial evidence rule. This action by Congress can hardly be squared with the view expressed by the court below to the effect that the statute permits it to embark upon a *"de novo* hearing" notwithstanding the existence of substantial evidence in the administrative record to support the administrative decision.

The pertinent committee reports furnish still further support for the view that the reviewing court, in determining the substantiality of evidence, is limited to a consideration of the record before the administrative agency. Thus, in reporting the Wunderlich bill out favorably, the House Judiciary Committee Report explained the role of the substantial evidence rule as follows:

> The proposed amendment also adopts the additional standard that the administrative decision must be supported by substantial evidence. The requirement that administrative action be supported by substantial evidence is found in the Administrative Procedures Act, supra. As understood by the committee and as interpreted by the Supreme Court in *Edison Company* v. *National Labor Relations Board* (305 U. S. 197, 229), "substantial evidence" means "such relevant evidence as a reasonable mind might accept as adequate to support a conclusion."

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de novo review undertaken by the court below in its decision in the present case and in *Volentine and Littleton* v. *United States*, 145 F. Supp. 952.

> The inclusion of the standard "not supported by substantial evidence" should also correct another condition arising out of the lack of uniformity between the various departments and agencies concerned in the appellate hearing procedures under the disputes clause. It has been brought to light in public hearings that it is the exception rather than the rule that contractors in the presentation of their disputes are afforded an opportunity to become acquainted with the evidence in support of the Government's position. *It is believed that if the standard of substantial evidence is adopted this condition will be corrected and that the records of hearing officers will hereafter contain all of the testimony and evidence upon which they have relied in making their decisions.* It would not be possible to justify the retention of the finality clauses in Government contracts unless the hearing procedures were conducted in such a way as to require each party to present openly its side of the controversy and afford an opportunity of rebuttal. [Emphasis added.] [H. Rep. 1380, 83rd Cong., 2d Sess., pp. 4–5.]

This congressional concern with the need for a full administrative record containing "all of the testimony and evidence" underlying the administrative decision manifests, we submit, a clear congressional purpose to limit judicial review to such testimony and evidence. Certainly, it would have been an empty gesture for Congress to insist on development of a full administrative record and at the same time permit that record to be completely ignored by the reviewing court, as it was in the present case.

3. Centralization of most government contract litigation in the Court of Claims[7] frequently eliminates the possibility of a conflict in decisions. It is highly significant, therefore, that a conflict has already developed on the precise issue here involved. *Langoma Lumber Corp.* v. *United States*, a district court decision affirmed by the Court of Appeals for the Third Circuit, flatly holds that, for the purpose of the substantial evidence test in the Wunderlich statute, the reviewing court is limited to the record and evidence before the administrative board or agency, 140 F. Supp. 460, 461, 462 (E. D. Pa.), affirmed 232 F. 2d 886. Accord: *L. W. Foster Sportswear Co.* v. *United States*, 145 F. Supp. 148, 149 (E. D. Pa.).

4. The vast majority of formal government construction and procurement contracts contain a "disputes" clause comparable to the one involved here, and both the Wunderlich statute and the decision below will apply to all suits in the Court of Claims arising out of such contracts. The issue is therefore sufficiently important and general to be resolved by this Court. More than that, the decision below, if allowed to stand, would undoubtedly burden the entire mass of military and other governmental procurement in serious fashion. It would strip the administrative boards, which facilitate and expedite such procurement by avoiding the expensive and time-consuming litigation of technical factual disputes, of power to function effectively. The Assistant Judge Advocate

[7] 28 U. S. C. 1346 (a) (2) imposes a $10,000 ceiling on district court jurisdiction over government contract claims.

General of the Army, in noting the adverse effect of the decision below, has stated:*

> The importance of this decision to the Department of the Army and its far-reaching implications upon governmental procurement in general cannot be overemphasized. The Corps of Engineers Claims and Appeals Board, the Armed Services Board of Contract Appeals Board and for that matter all governmental appeal boards, would be adversely affected if this decision is allowed to stand. If every decision of the Armed Services Board of Contract Appeals were subjected to a trial *de novo* in the Court of Claims on the merits, the utility of the Board as an administrative body, would be greatly impaired. No decision unfavorable to the contractor would be afforded finality. Contractors soon would appeal virtually every adverse decision of the Board to the court merely by alleging there was not substantial evidence. This would result in a far greater case burden upon the court as well as a diminution in the utility of the Board.

CONCLUSION

For the foregoing reasons, it is respectfully submitted that the petition for a writ of certiorari should be granted.

J. LEE RANKIN,
Solicitor General.
GEORGE COCHRAN DOUB,
Assistant Attorney General.
PAUL A. SWEENEY,
MORTON HOLLANDER,
Attorneys.

SEPTEMBER 1957.

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* Letter to the Attorney General, dated June 28, 1957.

APPENDIX

In the United States Court of Claims

No. 49316

(Decided June 5, 1957)

FEHLHABER CORPORATION v. THE UNITED STATES

Mr. John W. Gaskins for the plaintiff. *King & King* were on the briefs.

Mr. John F. Wolf, with whom was *Mr. Assistant Attorney General George Cochran Doub*, for the defendant. *Mr. Herbert M. Canter* was on the brief.

OPINION

LARAMORE, *Judge*, delivered the opinion of the court:

This suit arises as the result of a contract entered into by plaintiff, Fehlhaber Pile Co., Inc.,[1] a New York Corporation, with the defendant, acting through the War Department, for the construction of the substructure for the Chesapeake City Highway Bridge located at Chesapeake City, Maryland. Plaintiff alleges that during operations under the contract it encountered subsurface conditions which differed materially from those contained in the specifications and as a result thereof incurred additional expenditures in driving interlocking steel sheet piles for a cofferdam needed in the construction; in excavating for the pier designated Pier 1 N which was constructed within the cofferdam; and in driving steel H piles to support the pier. Plaintiff contends it is entitled to payment for the added expenditures in an amount in excess of $100,000 pursuant to the *Changed*

[1] Subsequent to the filing of this suit, plaintiff's name was changed from Fehlhaber Pile Co., Inc. to Fehlhaber Corporation.

conditions article of the contract. Plaintiff also seeks the return of liquidated damages assessed against it in the amount of $10,000 because of its failure to complete the contract on time.

The contract which called for the construction of 32 piers and 2 abutments for a bridge over the Delaware Canal included standard *Delays-Damages* and *Disputes* articles as well as the standard *Changed conditions* provision and was awarded after the publication of an Invitation for Bids which provided in part as follows:

> Bidders should carefully examine the drawings and specifications, visit the site of work, and fully inform themselves as to all conditions and matters which can in any way affect the work or the cost thereof. * * *

Defendant employed an architectural-engineering firm to make borings and compile boring logs showing the subsurface conditions at the various pier locations. This analysis, which also noted the number of blows per lineal foot required to drive the sampling spoon at the various depths, was made available to prospective bidders and indicated the type of materials that could be expected to be found to below elevation −100 feet, and was part of defendant's specifications for the job. For various reasons, including inconsistencies in the number of blows required to penetrate similar type materials, the number of blows on the sampling spoon was considered of little value to prospective bidders in determining the ease or difficulty with which the work at the subsurface could be accomplished.

As pertains to Pier 1–N, the subject of this suit, two borings, designated 1–NE and 1–NW, were made. Boring 1–NE showed no hard materials of any kind to elevation −50 to −51 where there was a foot of soft sandstone. At elevation −55.7 to −57.4, 1.7 foot, sandstone core was encountered and shown on the boring logs. Possible sandstone stratum was indicated at −90 to −91 feet.

Boring 1–NW showed soft sandstone from −44.3 to −45.2 and particles of sandstone between −45.2 and −52.0. From −53.9 to −54.9, sandstone, no core was reported. Pieces of sandstone were reported from −83.4 to −85.8. There were no other evidences of hard materials in the subsurface which would cause any difficulty during construction according to the boring logs.

The contract drawings showed the bottom of the footing for Pier 1-N at elevation −48, which would require excavation to be performed to that depth. The materials described on the contract borings to that elevation would have been easy to excavate, and from an engineering standpoint, nothing in the boring logs could reasonably have been construed as indicating that difficulty in the performance of the excavation would be experienced.

Plaintiff based its bid upon the information contained on the contract drawings and upon the conclusion that the materials to be encountered could be readily excavated.

Below −48, steel H piles were to be driven to support the pier. The materials described in the boring logs, both above and below the sandstone layers below that depth, should not have been difficult to penetrate. Resistances on the sampling spoon did not suggest or reveal materials which would cause high resistances to H piles driven by a heavy and powerful hammer. The soft sandstone at elevation −50 in boring 1-NE and −53.9 in boring 1-NW would offer little, if any, more resistance to H piles than would any other unconsolidated materials in the subsurface. The sandstone from −55.7 to −57.4 was not considered by plaintiff to be difficult to penetrate if the conditions underlying it were substantially as reported, such underlying conditions being reported as unconsolidated materials.

Concerning these borings, the contract and the specifications contained the following provisions:

> ARTICLE 1. *Statement of work*—The contractor shall * * * perform the work * * * *in strict accordance with the specifications*, schedules, and drawings, all of which are made a part hereof and designated as follows: * * *

Paragraph SC-7 of the Special Conditions of the Specifications provided in part as follows:

> SC-7 PHYSICAL DATA. The information and data furnished or referred to below are not intended as representations or warranties but are furnished for information only. It is expressly understood that the Government will not be responsible for the accuracy thereof or for any deduction, interpretation, or conclusion drawn therefrom by the Contractor.
>
> * * * * *

d. *Foundation Conditions.*—The contract plans show the results of borings and test piles driven at the site. Any conclusions drawn therefrom by the contractor as to the surface and subsurface materials to be encountered, the methods required to complete the construction shown on the plans, and the necessary lengths of piles are at the contractor's risk. The Government assumes no responsibility for the accuracy of the borings and tests above referred to or the published results thereof, nor does it represent that materials other than or in proportions different from those shown will not be encountered. Samples of materials removed from the bore holes may be seen at * * *.

Paragraph GC-2 of General Conditions of the Specifications provided as follows:

GC-2. SITE INVESTIGATIONS AND REPRESENTATIONS. The Contractor acknowledges that he has satisfied himself as to the nature and location of the work, the general and local conditions, particularly those bearing upon transportation, disposal, handling and storage of materials, availability of labor, water, electric power, roads and uncertainties of weather, river stages, tides or similar physical conditions at the site, the conformation and condition of the ground, the character, quality and quantity of surface and subsurface materials to be encountered, the character of equipment and facilities needed preliminary to and during the prosecution of the work and all other matters which can in any way affect the work or the cost thereof under this contract. Any failure by the Contractor to acquaint himself with all the available information concerning these conditions will not relieve him from responsibility for estimating properly the difficulty or cost of successfully performing the work. * * *

The plaintiff did examine the site of the proposed construction and the physical samples that defendant acquired from its borings. It did not, however, make borings of its own because of the limited time allowed for bidding and because the existence of regularly scheduled traffic in the channel would have made such an attempt impracticable. The record also discloses that it was not contemplated that prospective bidders would conduct boring operations and in fact it was not done. Plaintiff prepared its bid on the basis of the plans and specifications submitted by defendant, was subsequently awarded the bid and ordered on June 3,

1946, to commence operations. The contract called for completion by December 22, 1946. For various reasons, none of which were granted expressly for changed conditions, extensions were granted which pushed the contract completion date up to June 7, 1948. The defendant did not consider the contract substantially complete until July 27, 1948, and, therefore, assessed liquidated damages for 50 days at the rate of $200 per day as called for in the contract and in the total amount of $10,000.

Plaintiff had on numerous occasions during the period of construction notified defendant that it intended to make, and in fact was making, claim for excessive costs in accordance with the *Changed conditions* article of the contract, its contention being that the excess costs arose because the subsurface conditions materially differed from those shown on the contract drawings and specifications.

Defendant first denied such relief by letter from the contracting officer on September 15, 1947, wherein he referred to plaintiff's oral request for changed conditions relief during a telephone conversation on September 4, 1947, and advised that an investigation showed no changed conditions existed. He further notified plaintiff that no written contentions had been received and suggested procedure under article 15, the *Disputes* provision, within the next 30 days.

Written application had already been made by plaintiff, however, on September 12, 1947. By letters of October 3, October 10, and November 5, 1947, plaintiff set forth the details and extent of the excess costs claimed to have been incurred in the driving of the sheet piling and excavation for the pier base.

By letter of November 25, 1947, plaintiff submitted to the district engineer its claim for additional compensation covering the driving of H piles at Pier 1–N. This claim was also based on the *Changed Conditions* provision.

The contracting officer on December 3, 1947, denied plaintiffs claim for changed conditions at Pier 1–N. Thereafter, plaintiff was permitted to file two additional affidavits and the case was forwarded to the district engineer, the contracting officer's superior, who, under date of March 1, 1948, executed and transmitted to plaintiff written findings of fact denying changed conditions relief.

Plaintiff appealed under the *Disputes* article of the contract on March 18, 1948, and was given a hearing by the Corps of Engineers Claims and Appeals Board which denied plaintiff's claim in a written opinion dated February 15, 1949. This action was reviewed on February 25, 1949, and approved by the Chief of Engineers who was the duly authorized appellate authority. Plaintiff was notified of this action on March 14, 1949. Action was instituted in this court on September 28, 1949.

Defendant's initial defense here is that the administrative findings of fact and decision are final and conclusive on the parties as they were supported by substantial evidence. The Government contends this court cannot resort to a consideration of our own *de novo* findings unless and until we have, at the very threshold, reviewed the entire administrative record as a whole and found that that record did not contain substantial evidence to support the administrative findings and decision. In effect the Government says that a *de novo* hearing by this court is a nullity if the administrative decision is supported by substantial evidence in the administrative record as a whole, and that such *de novo* hearing should not even have been embarked upon if such substantial evidence existed.

Similar contentions in a similar situation were made by the Government in the case of *Volentine and Littleton, et al.* v. *The United States*, No. 62–54, decided November 7, 1956, and were rejected by the court.

While the writer of this opinion dissented in that case and still adheres to the views expressed in that dissent, he must bow to the majority and we hold against the Government's argument here.

Since *Volentine and Littleton* settled the problem there is no need for any comment thereon. The only thing we must decide now is whether the decision of the Corps of Engineers Claims and Appeals Board, approved by the Chief of Engineers, is supported by substantial evidence adduced at the trial *de novo* before this court notwithstanding the administrative record.

Defendant asserts that plaintiff's problems resulted from a miscalculation on its part of the difficulties to be encountered and that there was no material difference in the location or

amount of material encountered from that reported in the defendant's specifications. Defendant also asserts that plaintiff's operations on the whole were inefficient.

These assertions, however, are not supported by the record which shows unquestionably that subsurface materials encountered at Pier 1–N materially and substantially differed from that which could be expected from a study of the contract drawings and specifications. The evidence also shows that plaintiff's operations at the site were reasonably efficient and that the equipment used was reasonably adequate for the job.

In this light, the decision of the Corps of Engineers Claims and Appeals Board is not supported by substantial evidence and is in fact contrary to the overwhelming weight of the evidence as the ensuing discussion herein will point out. The differences encountered by plaintiff fall squarely within the standard set forth in article 4 of the contract defining that which will constitute changed conditions.

Details of the problems encountered by plaintiff in driving the steel sheet piles for the cofferdam at Pier 1–N, in the excavation at Pier 1–N, and in driving H piles at Pier 1–N are set out in findings 18 through 79 and will be repeated herein only to the extent necessary to show the existence of changed conditions.

The cofferdam was to be constructed of 136 interlocking steel sheet piles which, according to the contract, were to be driven to approximately elevation −54.0 to −56.0, the top of a rock stratum. As noted previously, plaintiff anticipated no difficulty in driving to the prescribed depth because of the composition of the subsurface. Except for the previously indicated layers of sandstone, all other materials were sand, clayey sand, or gravel. Nevertheless, severe resistance was encountered from elevation −21 to −26 and from elevation −37 to −55 and the use of a jet was necessitated in driving at those points. Because of this resistance, and because of the necessity of applying an excessive number of blows of the steam hammer to the piles in an effort to drive them through the unexpected materials encountered, 30 percent of the piles were damaged and it was necessary on several occasions to burn off 3 to 5 inches of the butt ends. The sub strata was so hard that some 20 to 30 of

the sheet piles could only be driven to about four feet above the specified depth. Their tips rested at or about elevation −52 or −53, where the contract borings indicated sand or clay. The high sheets were driven to grade only after excavation was completed and by use of an oversized hammer. Work on the cofferdam was completed on April 10, 1947. On or about April 8, 1947, plaintiff orally advised defendant's district engineer of the difficulty encountered and that it would probably make claim for additional cost due to changed conditions.

After work on the cofferdam was completed, work began on the excavation which the contract required to be performed down to elevation −48. According to the borings, little trouble should have been encountered in this work as there was little or no hard materials down to that depth. Notwithstanding this, however, excavation between −21 and −26 was extremely difficult and was delayed considerably because much hard material difficult of excavation was encountered. At −21 feet, a 42-foot open end pipe weighing 1,700 to 1,800 pounds was permitted to fall some 20 to 25 feet onto the hard surface but was unable to penetrate until about 100 blows of a 6,700-pound steam hammer were applied to the pipe. This drove the pipe five feet. Three feet of sandstone and sand were recovered from the pipe at this level where according to the borings only fine sand, clay and gravel should be encountered. Generally, excavation between −21 and −26 was difficult enough to require the use of a water jet and a 1,200-pound pipe to break up the hard surface before excavation could be effected. After elevation −21 was reached, the ¾-yard bucket that was used up to that point had to be replaced by a one-yard heavy-duty clamshell bucket with 8-inch steel teeth. During the excavation, these teeth were often worn to the point where they needed replacing. The extreme resistances that were being experienced continued to −26.

From −26 to −37 no undue difficulty was met. From −37 through −48, sandstone continually slowed up progress. The use of a jet was necessitated and it was used in the west end of the cofferdam from −37 to −46.6 and on the east end between elevations −37 and −42.

At the suggestion of the defendant's resident engineer a 50-foot steel H beam weighing about two tons with a sharpened point was used as a chopping bit to penetrate and break up the sandstone. It was dropped from a height of about 30 feet with a resulting 60,000 foot-pounds of energy being exerted in each drop.

The use of a jet and the 1,200 pound pipe between −21 and −26 and the use of the 50-foot two-ton steel H beam between −37 and −48 are considered extraordinary procedures when subsurface conditions are as should have been encountered according to the contract drawings and specifications.

Because of the existence of sandstone throughout the entire subsurface area of the cofferdam, plaintiff was advised on September 8, 1947, that defendant would accept as the final grade for Pier 1–N a higher elevation than the specified −48. When excavation was finally completed the average grade was −46.6 and the entire bottom of the cofferdam was covered with hard sandstone.

Plaintiff, at its own expense on several occasions had an independent laboratory analysis made of the materials being encountered. Of materials recovered at −21 and −23 the report was that the rock consisted of finely laminated to massive silt stone ranging to clay stone, consisting of thin bands of clay intermixed with fine silt, and some bands rather firmly cemented by iron oxide. The compressive strength of the softest layer was 481 pounds per square inch, and the hardest, containing iron ore cement, was 2,390 pounds per square inch. This rock was quite friable in that particles of silt could be rubbed out of the clay matrix, particularly when dry. The samples revealed a type of material compact in mass which had the faculty of absorbing a blow without shattering or crumbling over an area of more than an inch or two from the point of impact. From an engineering standpoint, the material represented by the samples was a soft sandstone which would be very difficult to excavate. Rock, such as represented by the samples, weakens with excessive moisture or upon air drying, and has its maximum strength under normal subsurface conditions.

Two samples recovered at −42, each of which were solid pieces of stone and weighed 500 pounds, were also independently analyzed and tested and found to be sandstone, the largest part of which consisted of an aggregate of quartz grains cemented with calcium and iron carbonate, the rest being numerous laminated layers varying from as little as ⅛ inch up to a few inches thick of material cemented with iron oxide or bog iron. Approximately 36.5 percent of the rock was cementing agents with the rest being particles of sediment. It was a firm aggregate of cemented sand. Compressive strength of this stone ranged from 1,590 to 2,380 pounds per square inch. Typical sandstone, according to the authoritative Handbook of Physical Constants, ranges from 1,560 to 3,500 pounds per square inch. This rock has considerable resistance to the kind of stresses exerted by heavy equipment used in excavation. The sand grains of this stone are completely unaffected by moisture and its cementing agents are practically insoluble in water. It would have no tendency to soften or weaken in water, but would have the same attributes in its natural state as it did in a dry condition in laboratory testing.

These samples from elevation −42 represented material more difficult to excavate than the material of which samples were previously obtained at elevations −21 to −23.

Plaintiffs problems did not stop after excavation was completed. The contract called for 231 steel H piles, each 55 feet in length, weighing 89 pounds per foot, to be driven within the cofferdam to support Pier 1-N. Each pile was to be driven at least 40 feet below the bottom of the excavation at −48, or to elevation −88, and until such pile attained a safe bearing load of 60 tons as determined by a specified formula with a hammer that developed a minimum of 19,000 foot-pounds of energy per blow. To achieve the 60 tons of bearing capacity, the formula called for resistance of each pile at the rate of 90 blows per foot for the last foot after minimum penetration of 40 feet. If a pile reached required resistance at the minimum depth at −88, the excess length of projection above the bottom of the excavation could be cut off. If the 55-foot pile was driven to maximum depth, its tip end would be 47 feet below elevation −48 or at −95.

According to the contract boring logs, there were no layers of sandstone between elevations −46 and −88 except one foot of sandstone between elevations −53.9 and −54.9 on boring 1-NW and one foot of soft sandstone between −50 and −51, and 1.7 feet of sandstone between −55.7 and −57.4 on boring 1-NE.

Because of unconsolidated materials which the boring logs indicated were underlying the sandstone at the indicated elevations, no trouble was expected to be encountered in penetrating the sandstone layers.

Plaintiff met little trouble between −46.6 and −55; however, between −55 and −57.4 maximum resistances of 90 blows or less per foot were encountered on 178 of the 231 steel H piles being driven; 91 to 180 blows per foot were needed on 37 of the piles; and 181 to 399 blows per foot on the remaining 16 piles.

High resistances were experienced between elevations −58 and −64 and again between −72 and the maximum depth to which the piles were driven which in the main ranged from −81 to −88.

Very high resistances were experienced between elevations −59 and −61 where 94 of the 231 piles drove at rates in excess of 100 blows per foot. Of the 94, 39 drove in excess of 200 blows; of the 39, 27 in excess of 400 blows; of the 27, 10 in excess of 1,000 blows; and of the 10, one in excess of 3,000 blows per foot.

Very high resistances were also experienced between elevations −81 and −88, where 218 of the 231 piles needed 181 to 399 blows per foot; of the 218, 125 at some elevation or elevations required 400 or more blows per foot.

These figures are significant in that the number of blows forecast to be needed at maximum resistance after minimum penetration of 40 feet was, as noted above, 90 blows per foot.

Because of the high resistances encountered, it was decided that all piles that required more than 400 blows per foot would be extracted because of the possibility of damage. The extracted piles showed their tips to be shattered and their flanges split, torn, and twisted for varying distances of from one or two feet to eight or ten feet. In some instances five to seven feet of rock were embedded in the flanges of the ex-

tracted piles. In some instances the excessive driving caused the butts of piles to become battered to the extent that they had to be cut off to avoid wedging of the anvil of the hammer. This occurred notwithstanding the fact that the hammer was equipped with a driving cap which fitted over the butt of the pile.

A sample of the rock which came from about elevation −60 was extracted from one of the damaged piles and analyzed. It was found to have a compressive strength of 34,400 pounds per square inch which is *50 percent stronger than average granite.*

Minimum penetration of −88 was never attained and when all the piles were in place and accepted by the Government the average penetration was 35.5 feet below the bottom of the excavation at −46.6 with eight of the piles being only 26 to 29 feet below. The average overall penetration of the piles was −82 with the highest at −72.7 and the lowest at −88. The Government was aware that the piles rested at higher elevations than the contract called for when it accepted them and knew as well of the resistances encountered in driving at the various levels.

The above outline of the difficulties encountered by plaintiff, not the least of which is the number of blows of the hammer required in driving the H piles in excess of the maximum resistance expected of 90 blows per foot after −88 was reached, indicates without a doubt that it did experience changed conditions and that it was damaged as a result thereof.

The Government points out in its brief that the specifications included caveatory and exculpatory provisions which warned that the information and data furnished to bidders was not intended as representations or warranties but was furnished for information only and that any conclusions drawn by the contractor as to surface or subsurface materials to be encountered were at the contractor's risk. The Government also pointed out that the general conditions of the specifications provided for acknowledgment by the contractor that he had made a site investigation and included a disclaimer by the Government as to responsibility for any understanding or representation made by any of its officers or agents.

The implication is, of course, that because of these provisions the plaintiff should be denied recovery as it did not make and analyze borings of its own, and that those provisions hold the Government harmless for any inconsistencies between the results of the borings reported in the specifications and drawings and those conditions which actually were encountered.

It would have been a virtual impossibility, however, for any bidder to make its own borings, analyze them, compute, prepare, and submit its bid after the Invitation for Bids was first published since there was only a 40-day interval between that publication and the opening of the bids. There were 32 piers and two abutments to be constructed. Borings in two to four places would be necessary at each location, not only at Pier 1–N. Therefore, we hold that because of the inability of the plaintiff to bore, analyze the borings, and to compute, prepare, and submit its bid within the short time allotted, plaintiff is not bound by the caveatory and exculpatory provisions of the contract and specifications and, conversely, those provisions do not relieve the defendant of liability for changed conditions as the broad language thereof would seem to indicate. Plaintiff had a right to rely on the Government's specifications and drawings and the Government is bound by any assertions made therein notwithstanding the fact that it was stated that that data would be for information only. Moreover, this court has repeatedly held that the specifications cannot alter the effect of the specific language of the *Changed conditians* section of the contract. See *Vade P. Loftis* v. *United States*, 110 C. Cls. 551; *Peter Kiewit Sons' Co.*, v. *United States*, 109 C. Cls. 517; *Walsh Brothers* v. *United States*, 107 C. Cls. 627; *Gustav Hirsch* v. *United States*, 94 C. Cls. 602.

We hold, therefore, that Article 4 of the contract entitled *Changed conditions* was not restricted in any sense by the language of the Invitation for Bids or the specifications paragraph SC–7d or paragraph GC–2 which attempt to relieve the Government of all liability if the subsurface conditions were not as reported. We further hold, that the conditions encountered by plaintiff were materially different from those reported by the specifications and that this is exactly the type of situation anticipated by the *Changed*

conditions provision in the standard Government contract. Plaintiff should, therefore, be reimbursed to the extent that the changed conditions caused it to incur expenditures in excess of that which would have been incurred had the subsurface been as reported by the specifications.

Findings 29 and 30, 64, 79, and 85 through 91 outline in detail the additional costs incurred as a result of the changed conditions. Judgment will be entered in accordance with the computations therein in the amount of $50,414.90.

The only problem remaining is whether plaintiff is entitled to the recovery of the liquidated damages in the amount of $10,000 which were assessed by defendant because of delay in the overall completion of the contract. Plaintiff contends that the 110 days of additional work at Pier 1–N was responsible for it remaining on the project for an additional period of 65 days and that the court, therefore, should recognize the fact that the changed conditions caused the delay in the overall completion of the contract.

While there may be a direct relationship between the changed conditions which necessitated additional work at Pier 1–N and the delay in the overall completion of the contract, we cannot find that that is the case unless there is proof in support thereof, and there is none. While the record shows that plaintiff was delayed by changed conditions at Pier 1–N for a period of 30 calendar days in the driving of the sheet piles for the cofferdam, for 73 days in excavating for the pier base, and for 7 calendar days in the driving of the H piles, or a total of 110 calendar days, there is not sufficient evidence in the record to show that these delays caused an overall delay of the entire project. The only detailed evidence in the record concerns the pertinent operations at Pier 1–N, with only casual and superficial references to the other piers or to the project as a whole. Both parties deliberately endeavored to limit the evidence to Pier 1–N. We are unable, therefore, from the evidence before us to make a determination that the overall delay was caused by the changed conditions. Accordingly, plaintiff is not entitled to recover the liquidated damages assessed by defendant.

Judgment will be entered in favor of plaintiff in the amount of $50,414.90.

It is so ordered.

MADDEN, *Judge;* WHITAKER, *Judge;* LITTLETON, *Judge;* and JONES, *Chief Judge*, concur.

FINDINGS OF FACT

The court, having considered the evidence, the report of Commissioner Roald A. Hogenson, and the briefs and argument of counsel, makes findings of fact as follows:

1. The plaintiff, Fehlhaber Corporation, formerly known as Fehlhaber Pile Co. Inc., is a New York corporation with principal place of business at New York City. For the past twenty years it has engaged in heavy construction and has had considerable experience in work requiring the use of cofferdams.

2. This case concerns the construction of a bridge substructure by the plaintiff for the defendant, and involves (1) the question whether plaintiff in the construction of concrete Pier 1–N encountered changed conditions; (2) if changed conditions were encountered, the further questions whether they caused plaintiff increased costs (a) in driving interlocking steel sheet piles for the cofferdam, (b) in excavating for the pier, and (c) in driving steel H piles to support the pier; and (3) whether plaintiff shall be relieved of liquidated damages which have been assessed against it in the amount of $10,000.

3. Defendant invited bids on March 1, 1946, to be opened on April 9, 1946.

4. The work for which bids were requested and the contract later executed, consisted of the construction of 32 piers and 2 abutments for a bridge over the Chesapeake and Delaware Canal at Chesapeake City, Maryland.

5. The two main piers were 1–N and 1–S. Pier 1–N was intended to support the north end of the steel work for the bridge and approaching roadway above the canal, and Pier 1–S was to support the south end of the steel work for the bridge and the approaching roadway. Pier 1–N was in the channel of the canal. The canal was approximately 600 feet wide.

6. Available to prospective bidders were various contract drawings, one of which contained boring logs showing the results that had been obtained through borings which had been conducted at various pier locations in advance of the invitation for bids under the supervision of the architect-engineer firm retained by defendant to design the bridge and supervise construction. The boring drawings and material descriptions thereon were prepared by the architect-engineer firm. Defendant's resident engineer on the project was an employee of this firm.

7. Boring 1–NE on the contract drawings was located approximately 5 feet east of the location prescribed for Pier 1–N, and boring 1–NW was located approximately 5 feet west of such pier, both of said borings being on the centerline of the proposed pier.

Borings 1–NE and 1–NW described the various types of materials encountered from the bottom of the canal at about −11 foot elevation to depths below −100 foot elevation, such descriptions classifying the materials thus located principally as sands, clays, soft sandstone, or sandstone, as will more particularly hereinafter appear.

The description of the clays as soft, medium, and stiff was in relation to their sheer strength; the description of sands as fine, medium or coarse was in relation to their grain size and the description of the rock as "soft sandstone" or "sandstone" was in relation to its susceptibility to breakage under impact. From an engineer's standpoint, there is no distinction between sandstone and rock, but sandstone exists in varying degrees of hardness.

8. The contract borings also revealed the number of blows per lineal foot which were required to drive the sample spoon downward in the material encountered, and also indicated where a core drill had been used on sandstone. They did not reveal the number of blows required to drive the casing for the sampling spoon, which information defendant had collected.

The resistances to the sampling spoon were not intended by the defendant to indicate sandstone unless the spoon was unable to penetrate. The number of blows on the sampling spoon on borings 1–NW and 1–NE varied from the low of 7 blows per lineal foot at elevation −24 (described

as fine white sand and some small gravel) on boring 1–NW to the high of 355 blows at elevation −59 (described as very fine, extremely hard, light brown clayey sand) on the same boring. Generally, the spoon resistances showed wide degrees of variation in materials bearing relatively the same general description, such as 62 blows in "fine yellow clayey sand" at elevation −24 in boring 1–NE, 158 blows in "fine gray and brown sand" at −55, and 244 blows in "fine light brown, light gray and yellow sand, traces clay" at −84 on the same boring.

The spoon resistances could be interpreted as indications of varying degrees of compaction of the materials described, but the mere presence of a great number of fine particles can offer very great resistance to the spoon, quite independently of cementation or induration. High and low resistances are indicated at elevations on the contract borings where the described material is fine sand.

It is concluded that the tabulation of spoon resistances on the contract borings was of little value to prospective bidders in the preparation of their bids. The plaintiff so treated this information.

9. Paragraph SC–7 of Special Conditions of the Specifications provided in part:

> SC–7. PHYSICAL DATA. The information and data furnished or referred to below are not intended as representations or warranties but are furnished for information only. It is expressly understood that the Government will not be responsible for the accuracy thereof or for any deduction, interpretation, or conclusion drawn therefrom by the Contractor.
>
> * * * *
>
> d. *Foundation Conditions.*—The contract plans show the results of borings and test piles driven at the site. Any conclusions drawn therefrom by the contractor as to the surface and subsurface materials to be encountered, the methods required to complete the construction shown on the plans, and the necessary lengths of piles are at the contractor's risk. The Government assumes no responsibility for the accuracy of the borings and tests above referred to or the published results thereof, nor does it represent that materials other than or in proportions different from those shown will not be encountered. Samples of materials removed from

the bore holes may be seen at the U. S. Engineer Sub-Office at Chesapeake City, Md., or at the Office of Parsons, Brinckerhoff, Hogan and MacDonald, 142 Maiden Lane, New York, N. Y.

10. The proposed form of contract upon which plaintiff bid, as well as the contract form later executed, contained in Article 4 the following provision:

> ARTICLE 4. *Changed conditions.*—Should the contractor encounter, or the Government discover, during the progress of the work subsurface and/or latent conditions at the site materially differing from those shown on the drawings or indicated in the specifications, or unknown conditions of an unusual nature differing materially from those ordinarily encountered and generally recognized as inhering in work of the character provided for in the plans and specifications, the attention of the contracting officer shall be called immediately to such conditions before they are disturbed. The Contracting Officer shall thereupon promptly investigate the conditions, and if he finds that they do so materially differ the contract shall with the written approval of the Secretary of War or his duly authorized representative, be modified to provide for any increase or decrease of cost and/or difference in time resulting from such conditions.

11. Paragraph GC-2 of General Conditions of the Specifications provided as follows:

> GC-2. SITE INVESTIGATION AND REPRESENTATIONS. The Contractor acknowledges that he has satisfied himself as to the nature and location of the work, the general and local conditions, particularly those bearing upon transportation, disposal, handling and storage of materials, availability of labor, water, electric power, roads and uncertainties of weather, river stages, tides or similar physical conditions at the site, the conformation and condition of the ground, the character, quality and quantity of surface and subsurface materials to be encountered, the character of equipment and facilities needed preliminary to and during the prosecution of the work and all other matters which can in any way affect the work or the cost thereof under this contract. Any failure by the Contractor to acquaint himself with all the available information concerning these conditions will not relieve him from responsibility for estimating properly the difficulty or cost of successfully performing the work. The Government assumes no responsibility

for any understanding or representations made by any of its officers or agents during or prior to the negotiation and execution of this contract, unless (1) such understanding or representations are expressly stated in the contract and (2) the contract expressly provides that responsibility therefor is assumed by the Government. Representations made but not so expressly stated and for which liability is not expressly assumed by the Government in the contract shall be deemed only for the information of the Contractor and the Government will not be liable or responsible therefor.

12. The Invitation for Bids by paragraph 8 provided in part:

> Bidders should carefully examine the drawings and specifications, visit the site of work, and fully inform themselves as to all conditions and matters which can in any way affect the work or the cost thereof. * * *

13. Before bidding plaintiff examined the project site, and its chief engineer examined such physical samples as were retained by defendant from the contract borings.

Plaintiff made no individual borings at the site in advance of bidding. Because of the amount of time allowed for submission of bids and the existence of regularly scheduled traffic in the canal, it is found that it was not contemplated, nor was it reasonably practicable, for prospective bidders to conduct boring operations on the piers in general and Pier 1–N in particular.

14. Plaintiff executed and submitted its bid proposal to perform the work according to the plans and specifications submitted by defendant. In the preparation thereof, plaintiff considered defendant's express disclaimer of responsibility for accuracy of the borings, but relied upon provisions of Article 4 of the proposed contract form relating to changed conditions.

15. On May 6, 1946, following the acceptance of its bid, plaintiff entered into a contract (W 36–109–eng–1143) with the War Department, Corps of Engineers, for performance of the above-described work in accordance with the specifications and drawings, for the consideration of $1,134,887.

The contract called for completion of the work within 200 calendar days after receipt by the contractor of notice to proceed, and contained a provision for liquidated damages

to be paid by the contractor at the rate of $200 for each calendar day of delay beyond the contract period and any extensions thereof.

The contract contained the usual "Delays-Damages" article which provided that time for performance was to be extended because of any delays "due to causes beyond the control and without the fault or negligence of the contractor," and further provided:

> The contracting officer shall ascertain the facts and the extent of the delay and extend the time for completing the work when in his judgment the findings of fact justify such an extension, and his findings of fact thereon shall be final and conclusive on the parties hereto, subject only to appeal, within 30 days, by the contractor to the head of the department concerned or his duly authorized representative, whose decision on such appeal as to the facts of delay and the extension of time for completing the work shall be final and conclusive on the parties hereto.

The contract also contained a "Disputes" article as follows:

> *Disputes.*—Except as otherwise specifically provided in this contract, all disputes concerning questions of fact arising under this contract shall be decided by the Contracting Officer subject to written appeal by the Contractor within 30 days to the Head of the Department concerned or his duly authorized representative whose decision shall be final and conclusive upon the parties hereto. In the meantime the Contractor shall diligently proceed with the work as directed.

16. Notice to proceed was issued by defendant on June 3, and received by plaintiff on June 5, 1946, and the contract completion date thus became December 22, 1946.

By December 18, 1946, defendant had granted extensions of time totaling 19 calendar days on account of three change orders not pertinent to Pier 1–N but otherwise modifying the specifications, thus extending the contract time to January 10, 1947. On the latter date, defendant in writing granted a further extension to June 9, 1947, because of delay to the contractor resulting from delays of subcontractors due to strikes. In March 1947, defendant granted extensions totaling 18 calendar days, or to June 27, 1947, on account of two change orders requiring steel-pipe concrete-filled piles

in lieu of timber piles on Piers 13–S, 14–S and 15–S. On May 9, 1947, defendant by change order further extended the contract performance time to September 20, 1947, on account of delay encountered in driving steel sheeting at Pier 1–S because of defective interlocks on the sheets as fabricated.

On June 3, 1947, defendant by change order increased the contract consideration by $18,653.97 and allowed 20 calendar days, additional performance time on account of subsurface conditions differing materially from those shown on the contract drawings, thus extending the performance time to October 10, 1947. This change order settled all claims arising under Article 4 of the contract, except future claims that might arise under Piers 1–S, 13–S, 14–S and 1–N.

On account of subsurface conditions at Piers 1–S, 13–S and 14–S materially differing from those shown on the contract drawings, defendant, by change order predated October 6, 1947, increased the contract consideration by $12,476.17 and allowed a further time extension of 32 calendar days, or to November 11, 1947.

On March 30, 1948, and again on July 8, 1948, defendant by two change orders allowed a total extension of 49 calendar days on account of delay in contract performance due to unusually severe weather, thus extending the contract time to December 30, 1947.

On January 19, 1949, which was a few months after completion of the contract work, the defendant by change order granted the last of its extensions of the contract time for a period of 160 calendar days on account of acute labor shortage from November 15, 1946, to July 27, 1948, thus extending the contract completion date to June 7, 1948.

Defendant ultimately assessed and withheld from sums otherwise due, liquidated damages in the sum of $10,000 representing 50 calendar days of delay after June 7, 1948, through July 27, 1948 when the last concrete pour on the project was completed and the defendant treated the contract work as substantially completed. Actually, there was contract work performed thereafter, such as dressing of the bridge seats atop Piers 1–N and 1–S, stripping of forms from the concrete pour at the top of Pier 1–N, removal of

part of the cofferdam on Pier 2–N, and general clean-up operations. The contract work was completed on September 1, 1948, 86 calendar days after the expiration of the contract completion date as extended by the defendant.

17. Paragraphs 3–01a and 3–08c of Technical Provisions of the Specifications provided as follows:

> 3–01. PIER 1 N.—*a. Base.*—The pier shall be founded on steel H-Piles with the bottom of the base at elevation −48. The excavation for the base shall be accomplished by means of a steel sheet pile cofferdam. If the excavation is completed before driving the bearing piles, no backfilling will be permitted after the piles are driven. If the excavation is completed after the piles are driven, the material surrounding the piles and adhering to them shall be removed to elevation −48, and a final inspection and clean-up shall be made by a diver to insure that this work has been properly done.
>
> The lower portion of the base shall be constructed by depositing a seal course of tremie concrete; the balance of the base and the shafts shall be constructed in the dry—all as indicated on Sheet 3 of the contract drawings.
>
> The steel sheet piling for the cofferdam shall be driven through any overlying strata of rock to the rock stratum indicated by the borings as located approximately between elevations −54 and −58. The cofferdam shall be built to withstand the pressures to which it will be subjected during construction of the piers. Bracing shall be designed to clear all pier concrete. The designing of the cofferdam and its bracing shall be done by the contractor, and complete plans therefor shall be submitted to the Contracting Officer for his approval but such approval shall not relieve the contractor of his responsibility to furnish a cofferdam of adequate strength. The interior dimensions of the cofferdam shall be such as to give sufficient clearance for the driving of the foundation piles and for the construction and inspection of the forms. (See paragraph 1–19)
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> * * * * *
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> 3–08. DRIVING PILES. * * * *c. Steel H-Piles.*—Splicing of steel piles will not be permitted. Unless the piles are sufficiently long to permit the head to project above water at all times (and subsequently cut off at the required elevation) the piles shall be driven by means of a follower, or an underwater hammer, which shall be guided by leads of an approved type which extend to the bottom of the excavation and are secured by pene-

tration into the ground. The follower shall be made of steel of area and section modulus not less than the pile. The bottom of the follower shall be equipped with a driving shoe designed to fit over the top of the pile in such a manner as to hold follower and pile in line. The driving head on the hammer shall be adapted to the top of the follower, which shall have sufficient area to prevent crushing and yielding of the metal.

The piles shall be driven not less than 40 feet and to a safe bearing load of 60 tons as determined by the specified formulas with a hammer that develops a minimum of 19,000 foot pounds of energy per blow. No deduction from the bearing capacity of the pile will be made because of the follower but the weight of the follower must be added to that of the pile in computing the bearing capacity.

The contractor shall determine his own method of penetrating the rock stratum at or near elevation −55 at pier 1N, but the method shall be such as to insure that the pile will not be subjected to undue damage. The Contracting Officer may require that representative piles be pulled for inspection after penetrating the rock to establish the sufficiency of the method adopted. The entire driving procedure shall be subject to the approval of the Contracting Officer. The attention of the Contractor is especially directed to the fact that the fine-grained material immediately underlying this rock stratum is likely to be very easily displaced by jetting and that such displacement on a large scale would endanger the construction of the pier base. The use of jets will not be parmitted below the elevation of the top of the rock.

DRIVING INTERLOCKING STEEL SHEET PILES FOR COFFERDAM AT PIER 1–N

18. As the location for Pier 1–N was in the canal approximately 30 to 50 ft. from the shore line, work on this pier had to be performed within a cofferdam. It was the only pier completely surrounded by water.

19. Elevation zero was the surface of the canal. At approximately elevation −11 was the bottom of the canal. The foot of the pier, according to the contract drawings, was originally intended to rest at −48. The steel H piles supporting the pier were originally intended to extend downward from the foot of the pier for a minimum distance of 40 feet or to a minimum elevation of −88.

20. The required cofferdam was rectangular in shape, being 75 feet long and 40 feet wide. It was constructed of 136 interlocking steel sheet piles each of which was 63 feet long, 21 inches wide, and ⅝-inch thick. The cross-sectional shape of each pile was not rectangular but resembled somewhat the letter Z with zig-zagging contour. The cofferdam was braced by three internal rings established at different levels and also by longitudinal and transverse struts.

21. Sheet 3 of the contract drawings contained the following note describing the elevation to which the tip of the sheet piling was to be driven:

> 4. The bottom of the steel sheet piling at pier 1–N shall be driven to the top of the rock strata at approximately elevation −54.0 to elevation −56.0 * * *

Specification 3–01 a, above-quoted, stated that the sheet piling would be driven through "any overlying strata of rock" to the rock stratum indicated by the borings as located "approximately between elevations −54 and −58."

22. According to boring 1–NW, the "overlying strata of rock" consisted of 0.9 of a foot of soft sandstone at elevation −44.3 to −45.2 and the top of the rock stratum to which the sheet piles were to be driven was at elevation −53.9, where a one-foot layer of sandstone was shown between elevations −53.9 and −54.9. No other sandstone was shown at any other elevations from the bottom of the canal at −11.8 to −94, a depth below any elevation to which plaintiff did or was to perform any work under the contract. The log on boring 1–NW did indicate presence of small particles of brown sandstone in fine to medium brown sand from −45.2 to −52, but this reference was admittedly of no significance to prospective bidders.

Boring 1–NE showed the "overlying strata of rock" to be one foot of soft sandstone from elevation −50 to −51. The rock stratum to which the sheet piles were to be driven was shown at elevation −55.7 to −57.4. No sandstone was shown at any other elevations from the bottom of the canal at −10.4 to −89.4 which was below any elevation to which plaintiff performed work under the contract.

23. The purpose of the note on sheet 3 of the contract drawings and of the similar language in paragraph 3–01 a of the specifications was to have the sheet piles driven so that their

tips would have a firm hold in the layer of sandstone, the top of which was indicated as existing at an elevation varying between −53.9 and −55.7. Because of the description on both borings of the overlying 1-foot rock stratum as "soft sandstone", and because of the indication that the materials above and below the overlying stratum were chiefly sands with some clay, it appeared from the contract drawings that the sheet piles could be driven to and through the overlying stratum and to the specified depth without difficulty.

24. Revised plans and detailed drawings showing the proposed method of installation of the cofferdam at Pier 1–N were submitted by plaintiff and approved by defendant's architect-engineer firm on October 4, 1946.

Although the plaintiff's original progress schedule indicated sheeting operations on Pier 1–N would commence in July 1946, plaintiff's suppliers of sheet piling and the steel for fabricating bracing frames for Pier 1–N failed to make delivery until November 20, 1946, when plaintiff commenced construction of a necessary work trestle for the handling of materials, loading of trucks, and similar activities.

25. The erection of the temporary driving frame for the sheet piles, which consisted of timbers supported by timber piles, was accomplished during two periods, from February 19 to 26 and from March 12 to 17, 1947. This was the initial operation on Pier 1–N.

During the interval between the two periods of erection of the driving frame, plaintiff accomplished the sticking, or initial placement, of the sheet piles along the perimeter of the cofferdam to the extent that the frame had been erected, and upon completion of the frame on March 17, 1947, recommenced and proceeded with sticking until enclosure of the cofferdam on March 21, 1947.

Driving of the sheet piling to final elevation commenced on a two-shift-per-day basis on March 24, 1947, and was completed on April 10, 1947, except for 20 to 30 high sheets later driven as hereinafter related.

All of this work and the later excavation and H-pile driving had to be done by means of cranes mounted on barges.

26. The cranes and other equipment which plaintiff used for the driving of sheet piles for the cofferdam were adequate,

in reasonably good working condition, and required no unusual repairs throughout the sheeting operations.

27. In driving the sheet piles, plaintiff encountered severe resistances at various elevations within the areas from −21 to −26, and from −37 to −55.

Commencing with the fifth day of driving on March 28, 1947, and thereafter for 14 shifts throughout the operation ending on April 10, 1947, plaintiff employed a water jet as a means of reducing skin friction resistance of the sheet itself so that greater force of the hammer could be brought to bear on the material resisting the pile. It is neither customary nor desirable to use a jet as an aid to driving sheeting through sands and similar materials because the outwash from the jetting tends to throw the sheeting out of plumb and adversely affect the bracing structure. Such a procedure is employed infrequently and only when penetration through hard materials cannot otherwise be obtained. A jet is not used as a chopping bit in a sheeting operation because the end of a sheet pile has a relatively sharp edge and is much more effective than any jet in breaking through hard strata, but a jet is effective in furnishing water to wash materials away from and lubricate the sheet pile.

Resistances are normally encountered at the lowest elevations in driving sheet piling due to the stresses generated in the interlocks of the sheets. The resistances encountered by plaintiff occurred at high and low elevations, and were of substantially greater intensity than those ordinarily caused by interlock stresses.

The high resistances required that an excessive amount of energy be applied to the sheet piles by the steam hammer, and approximately 30 percent of the sheets were damaged. It was repeatedly necessary to burn 3 to 5 inches off the butt ends. Some sheets were cut off as many as six times. This damage occurred even though the sheet pile specified and used was one of the heaviest manufactured.

The 20 to 30 sheet piles which could not be driven to prescribed elevation by April 10, 1947, ranged to as much as 4 feet above specified depth, with the tips of some of them at or about elevations −52 or −53, where the contract borings indicated sand or clay. The defendant's resident engineer reported as of April 12, 1947, that at Pier 1–N "all

sheeting is founded on sandstone strata at or about the required elevation." These "high" sheets then existed on three sides of the cofferdam. After excavation had been completed within the cofferdam, plaintiff proceeded from October 30 to November 3, 1947, to drive the high sheets to grade by use of an oversized hammer.

28. On or about April 8, 1947, plaintiff at the site of the work orally advised defendant's District Engineer that plaintiff was encountering difficulty in driving the steel sheeting at Pier 1-N, that it appeared that plaintiff would make claim for additional cost due to changed conditions, but that decision to make such claim would be deferred until subsequent excavation revealed the character of materials encountered.

29. The hard materials encountered in driving the sheet piling are more fully described in later findings concerning excavation of the cofferdam and driving of the steel H piles for the pier foundation.

In driving the cofferdam sheeting, plaintiff encountered subsurface conditions materially different from those indicated by the contract drawings.

If conditions had been as represented, plaintiff could have set and driven 15 sheets per 8-hour shift and thus have taken 9 shifts to drive the 136 sheets that were placed. It was reasonably estimated by plaintiff that 5 shifts would be required to set the driving frame. A total of 14 shifts, or 18 calendar days, would have been required for the entire operation. This work actually was done over a period of 51 calendar days from February 19, 1947, through April 10, 1947, utilizing 43 shifts, of which 11 shifts were employed on the driving frame and miscellaneous matters, none of which were affected by changed subsurface conditions. The remaining 32 shifts were devoted to sticking and driving of sheeting, and the excess number of such shifts caused by the changed subsurface conditions amounted to 23.

30. Reasonable costs incurred by plaintiff on the sheeting and bracing operations amounted to $5,181.97 for labor for the 43 shifts and $5,660 for equipment use (including fuel) for the 51 calendar-day period, or total direct costs of $10,841.97.

These costs, being an average of $252.14 for each of the 43 shifts, amounted to a total of $5,799.22 for the 23 excess work shifts.

EXCAVATION AT PIER 1–N

31. The contract drawings showed the bottom of the footing for Pier 1–N at elevation −48, which would require excavation to be performed to that depth. The boring logs on the contract drawings indicated the various types of material to be encountered to elevation −48, as follows:

Boring 1–NE

Elevation	*Description*
Zero to −10.4	Water.
−10.4 to −13.5	River mud (sandy).
−13.5 to −18.7	Fine yellow sand & soft gray clay mixed. Gravel.
−18.7 to −22.9	Fine white sand & clay mixed.
−22.9 to −26.9	Fine yellow, clayey sand.
−26.9 to −35.3	Fine light gray sand.
−35.3 to −42.4	Fine yellow sand.
−42.4 to −50.0	Fine to medium gray-brown sand, with traces of clay.

Boring 1–NW

Zero to −11.8	Water.
−11.8 to −18.0	River mud.
−18.0 to −21.7	Light gray sand, streaks of brown sand, with some clay.
−21.7 to −24.7	Fine white sand & some small gravel.
−24.7 to −37.5	Fine yellow clayey sand, fine yellow sand.
−37.5 to −42.5	Very fine light gray sand.
−42.5 to −44.3	Very fine light gray sand.
−44.3 to −45.2	Soft sandstone.
−45.2 to −52.0	Fine to medium brown sand. Small particles of brown sandstone. Some clay.

32. The materials described on the contract borings to elevation −48 would have been easy to excavate, and from an engineering standpoint, nothing in the boring logs could reasonably have been construed as indicating that difficulty in the performance of the excavation would be experienced.

Plaintiff based its bid upon the information contained on the contract drawings and upon the conclusion that the materials to be encountered could be readily excavated.

33. Plaintiff used a heavy-duty Marion steam crane mounted on a barge to excavate Pier 1–N. The crane was properly designed for the type of excavation described in

the contract drawings and was in reasonably good condition. It had been used successfully on other piers under this contract, and operated with reasonable efficiency in the removal of the materials encountered at Pier 1–N. This crane had been equipped with a ¾-yard bucket with teeth, until June 19, 1947, shortly after the start of excavation at Pier 1–N, when plaintiff rigged to the crane a one-yard heavy-duty clamshell bucket having 8-inch steel teeth designed to penetrate materials as the two sections of the bucket were mechanically drawn together. The bucket was in good condition and as the teeth became worn, they were replaced.

Plaintiff had sufficient dump trucks and other equipment for the excavation operations at Pier 1–N.

34. As the cofferdam was braced by 3 rings or tiers at various elevations, the excavation fell into four phases in the order of its performance, as follows:

(1) Bracing ring No. 1 was placed at elevation +1, and approximately one foot of excavation into the canal bottom or to about elevation −12 was performed in order that the two other rings could be temporarily suspended below the first one. This excavation was completed May 8, 1947.

(2) Bracing ring No. 2 was placed at elevation −19, and to permit the setting of this ring with the third ring temporarily suspended below, excavation was conducted from elevations −12 to −24 from June 16 to July 17, 1947.

(3) Bracing ring No. 3 was set at elevation −36, and as a prerequisite, excavation was performed from −24 to −37 by August 13, 1947.

(4) The last stage of the excavation from −37 was started on August 18, 1947, and was stopped at an average depth of −46.6 on September 12, 1947.

35. On June 20, 1947, which was the fifth day on the second phase of excavation, at which time plaintiff was excavating at the east end of the cofferdam at elevations −21 to −23, approximately 20 to 25 feet from boring 1–NE, plaintiff reported to defendant's resident engineer that it was encountering difficult excavation due to hard material. At this elevation, boring 1–NE indicated fine sand with some clay mixed, but no sandstone. The resident engineer thereupon directed plaintiff to hoist by means of a line on the crane a 42-foot open-end pipe having a 10-inch diameter and weigh-

ing 1,700 to 1,800 pounds. This pipe was permitted to fall from just above the level of the water some 20 to 25 feet into the pertinent area of excavation.

The fall of the pipe did not cause it to penetrate any appreciable amount, and it was prevented from falling over by means of the hoist line. The steam hammer, weighing 6,700 pounds, was then permitted to fall on the pipe. There was no substantial penetration. Plaintiff then applied about 100 blows to the pipe by means of the steam hammer and drove the pipe about 5 feet. As so used, the hammer developed approximately 6,000 foot-pounds of energy out of a maximum capacity of 8,500 foot-pounds.

The pipe was then extracted and hoisted over the work trestle where it was struck with a sledge hammer to dislodge the material which remained in it. The material recovered from −21 to −24 consisted of 3 feet of sandstone and sand, the sandstone being laminated and from 6 to 8 inches thick. This core supported a 20-foot high column of water during hoisting of the pipe from the excavation to the work trestle. No sandstone was indicated on the contract borings at or near any of the elevations involved in the 10-inch pipe test.

36. At the time of the 10-inch pipe test, defendant's resident engineer requested plaintiff's crane operator to save samples of the materials being encountered at elevations −21 to −23, which the crane operator did, delivering several samples of hard material six inches in thickness. Plaintiff's superintendent could not agree with the proposed joint statement of the defendant's resident engineer concerning the nature of such samples, and the resident engineer disposed of them. The material consisted of laminated sandstone with at least one layer of extremely hard sandstone or bog iron ¼ to ½ inch thick, with the remaining laminations being friable sandstone of a substantial degree of cementation.

At a time just following the 10-inch pipe operation, the defendant's resident engineer advised the defendant's assistant officer in charge of construction contracts at the Philadelphia office of the District Engineer, that wafer-thin sandstone had been observed. In his daily report for June 20, 1947, defendant's resident engineer stated that "very hard stone" had been reported by plaintiff at elevation −23, but

that the sample retained in the pipe showed "white and gray sand, some clay, very thin strata (¼" to ½") of sandstone and yellow brown sand." For June 24, 1947, he reported that the material being excavated was the same as he had described on June 20.

By letter dated June 30, 1947, to the District office of the Corps of Engineers, at Philadelphia, plaintiff stated as a part of its explanation of delays i performance, that a layer of sandstone had been encountered at Pier 1-N not shown on contract borings. By letter dated July 9, 1947, defendant's resident engineer in his comments upon plaintiff's letter, stated to the Philadelphia office of the Corps of Engineers that the "core" retrieved from the 10-inch pipe showed "gray sand with thin clay stratifications overlying a medium brown sand" and that between these two classes of material was discovered "a very thin lens of sandstone or bog iron ⅛" to ¼" thick and estimated ½" maximum." He failed to report at any time the 6" samples furnished by the crane operator.

37. On July 14, 1947, as the excavation was approaching the end of the second stage at −24, plaintiff encountered harder materials which were described by the resident engineer's entry for that day in his personal diary record of the project as "heavier sandstone in this bay up to 6 inches thick but not solid", and for July 15, as "sandstone up to 6" thick but loosely stratified with sand."

This hard material was removed in pieces as large as 12 to 18 inches long and up to 6 inches thick. From July 14 to July 16, defendant's resident engineer admittedly observed the excavation of "chunks" of such material up to the largest size above-described, but he failed completely to mention the fact in his daily reports to the defendant covering those or any other days, and in the weekly report for the period ending July 19, 1947, his only statement with respect to materials being encountered at Pier 1-N was that on "Monday and Tuesday the jet was used to enable excavation to penetrate a strata at about El. −21 to −23 consisting of lenses of sandstone or 'bog iron' in four of the ten bays of the cofferdam." The daily and weekly reports to the defendant were prepared from the information recorded by the resident engineer in his personal diary of the project.

38. The architect-engineer firm through its employee who was defendant's resident engineer, knew that consolidated materials claimed by plaintiff to be sandstone were being encountered at elevations −21 to −23, but did not advise the contracting officer or the District Engineer of this fact. This firm had previously warned the contracting officer that recognition of changed conditions on Pier 2–S would aid the contractor in claiming changed conditions on 1–S on both of which piers changed conditions were found by the contracting officer.

39. Commencing on June 30, 1947, plaintiff made intermittent use of a water jet as an aid to excavating between elevations −21 to −26. This jet consisted of a pipe carrying water pumped at a pressure of 275 pounds per inch. Shortly thereafter and while excavation was proceeding at the same elevation, plaintiff replaced the first jet with a 50-foot jet pipe of heavy-duty steel which carried water at the same pressure but which was sharpened at one end and weighed approximately 1,200 pounds. This jet pipe was hoisted by the whip line attached to the crane and permitted to fall through the water from a height of approximately 20 feet onto the bottom of the excavation. The force of the fall of the pipe permitted enough penetration of the jet point into the sandstone strata to enable the water under pressure to work out the supporting layer of sand. By the chopping with the jet pipe and ripping with the teeth of the clamshell bucket, plaintiff was able to break up the sandstone into pieces small enough to be removed by the bucket. This heavy-duty jet was used over the entire area of the cofferdam.

Had the material been as indicated by the boring logs, the use of such a combination jet pipe and chopping bit would not have been required.

40. In late June or early July 1947, plaintiff by telephone advised defendant's construction officer (later the principal civilian engineer on construction projects) at the Philadelphia office of the District Engineer that the contract borings were erroneous and requested that defendant join with plaintiff in conducting an analysis of materials being encountered at Pier 1–N, each party to assume one-half of the cost thereof. The defendant's officer rejected the offer on

the grounds that no funds were available for such purposes and that defendant was satisfied with the contract borings on the information which it had received from the project. This officer had the duty to review all daily and weekly reports received from the resident engineer and to enter into and investigate all controversial matters arising at the project. He did not investigate the alleged changed conditions at Pier 1–N until September 8, 1947, and did not report his early July telephone conversation with plaintiff to the District Engineer.

41. On July 7, 1947, Professor R. W. Briggs of Columbia University, under engagement by plaintiff, visited the site of the work and made a selection of samples representative of material then being excavated between elevations −21 and −23 at Pier 1–N. Plaintiff wrapped the selected samples in heavy waxed paper, crated and shipped them to Professor Briggs at Columbia University.

Examination and test of the samples by a qualified geologist at Columbia University revealed that they were compacted and indurated rock, which could not be classified as unconsolidated sediment. This rock consisted of finely laminated to massive silt stone ranging to clay stone, consisting of thin bands of clay intermixed with fine silt, and some bands rather firmly cemented by iron oxide. The compressive strength of the softest layer was 481 pounds per square inch, and of the hardest, containing iron ore cement, was 2,390 pounds per square inch. This rock was quite friable in that particles of silt could be rubbed out of the clay matrix, particularly when dry. The samples revealed a type of material compact in mass which had the faculty of absorbing a blow without shattering or crumbling over an area of more than an inch or two from the point of impact. From an engineering standpoint, the material represented by the samples was a soft sandstone which would be very difficult to excavate, and materially differed from the unconsolidated materials indicated by the contract borings at the pertinent elevations. Rock, such as represented by the samples, weakens with excessive moisture or upon air drying, and has its maximum strength under normal subsurface conditions.

42. In excavating between elevations −21 to −26 at Pier 1-N, plaintiff encountered in receiving strata between layers of sand, sandstone of the nature represented by the samples tested, which sandstone strata varied in thickness and elevation but existed over the entire area of the cofferdam in such substantial quantities as to constitute subsurface conditions materially differing from those indicated on the contract borings, and which substantially prolonged the performance of the excavation work.

43. After excavation had reached such depths that the highest elevation was −26 and the second phase of excavation had thus been completed, preparations were made for placing bracing ring No. 2. On July 18, 1947, the cofferdam was pumped out to elevation −6 although the excavation was as deep as −28 in some places, and incoming tide reached flood stage at elevation +6.5 and caused overstressing of the braces and struts of ring No. 1 to the extent that it was necessary immediately to refloat the cofferdam to prevent further damage. The work of repairing bracing ring No. 1 was completed on July 25, and bracing ring No. 2 was lowered and secured in position on July 29, 1947.

44. Excavation was resumed on July 30, 1947, and from about elevation −26 to −37 the excavation was accomplished without undue difficulty. During this period, two cranes were assigned to Pier 1-N, a Lima gas crane being employed to excavate on a two 10-hour shift basis, and the Marion steam crane being used for one of the two shifts to operate a water jet and cast materials to points within the cofferdam to be rehandled by the Lima crane. Defendant's resident engineer had repeatedly criticized the use of only one crane and now the rehandling of materials within the cofferdam.

It would have been hazardous and impractical under the circumstances existing at Pier 1-N to have increased the boom length on either or both of the cranes and proceeded to swing both booms over the work trestle in an effort to eliminate rehandling of the materials.

Bracing ring No. 3 was placed in position on August 13, 1947.

45. Plaintiff commenced the last stage of excavation at Pier 1-N on August 18, 1947, continuing the use of two cranes with the Lima excavating and loading trucks on the

work trestle and the Marion (later replaced by Industrial oil-fired crane) jetting and rehandling the material. The simultaneous operation of two cranes was accomplished without interference of one by the other because the one raised and lowered the jet in vertical movement, while the other was engaged in excavating and loading which required horizontal movement of its boom. When the jetting crane exited to the other for rehandling, they were positioned at opposite ends of the cofferdam.

46. The only consolidated material indicated by the contract borings to exist between elevations −37 to −48 at Pier 1-N was 0.9 of a foot of "soft sandstone" at one end of the cofferdam in boring 1-NW between −44.3 to −45.2. With sand indicated as being above and below this stratum, it would be reasonably expected that such a layer of "soft sandstone" would not be difficult to excavate with a clam-shell bucket with teeth, and would not have required the use of an 80 beam as a chopping bit. Had the materials been as indicated by the contract borings, excavation would have been easy at the elevations between −37 and −48, and plaintiff prepared its bid on that basis.

47. On August 19, 1947, which was the second day after excavation had started at −37, plaintiff reported to defendant's resident engineer that it was encountering sandstone in the excavation of Pier 1-N, which was difficult to penetrate. The resident engineer recorded in his personal project diary and in his daily report to defendant that plaintiff was "encountering fine gray sand and some gray sandstone about 2" thick. Difficult to get through." In his weekly report for the period ending August 23, 1947, he further reported regarding Pier 1-N: "At or about 2' above grade (El. −48.0) a strata of sandstone about 2" thick has been encountered. In places it has been impractical to penetrate this strata and to excavate to final grade. This material has been encountered generally over the entire area of the cofferdam and its extent and feasibility of penetrating beyond it are being further developed."

It would not have been impractical or difficult to excavate or penetrate a 2-inch layer of sandstone, overlaid and underlaid with unconsolidated sands, even though extending over the entire area of the cofferdam. It is concluded that the

hard materials encountered were much thicker than described by the resident engineer and that the inference contained in his above-quoted language that such hard materials were then being encountered generally at −46 was erroneous in that plaintiff was then excavating generally at substantially higher elevations.

The defendant's assistant construction engineer from the Philadelphia office of the District Engineer visited the project on August 20, 1947, the day following the resident engineer's first observance of the layer of sandstone described by him as two inches thick, and the resident engineer either failed to mention the matter to him or minimized the difficulties to the extent that this construction official had no recollection that plaintiff was at that time excavating anything but sand. This construction engineer was aware that plaintiff had been claiming changed conditions from below elevation −21, and was the assistant to the officer charged with investigating such claims.

48. On August 21, 1947, the cofferdam was probed with a jet, and it was found that the sandstone being encountered extended generally over the entire area, with the jet being able to penetrate in some places but not in others.

From −37 to −46.6 plaintiff, at the request of and with full knowledge of the resident engineer, used the jet throughout the excavation operation in the west end of the cofferdam and in the east end between elevations −37 and −42.

49. On August 20, 1947, plaintiff at the suggestion of the resident engineer began using a 50-foot steel H beam as a chopping bit or spud to penetrate and break up the sandstone. The excavation was then at various elevations from the deepest at −46 to the highest at −38. The H beam was used throughout the entire cofferdam, but more extensively in the westerly half.

The H beam weighed approximately 80 pounds per foot or about two tons, and its point was sharpened. The beam was attached to a cable on the crane which raised it to the surface of the water and then permitted it to drop more than 30 feet to the bottom of the excavation to break up the sandstone. Approximately 60,000 foot-pounds of energy were exerted on each drop of this chopping bit, the resistance of the water being comparatively negligible.

50. On August 29, 1947, Professor Briggs of Columbia University returned to Pier 1-N at plaintiff's request. In his presence, a bucketful of the material was taken from about elevation −42 and placed on the trestle for his examination. Soundings conducted at the time indicated that the bottom of the excavation ranged between elevations −37 to −45. Briggs selected representative samples from this material which plaintiff caused to be crated and shipped to Columbia University in the same manner previously followed with respect to samples taken from Pier 1-N and other piers on the project. The samples were representative of the sandstone encountered by plaintiff between elevations −37 to −46.

51. Two of the samples, each weighing 500 pounds and being solid pieces of stone, were later analyzed and tested by a qualified geologist at Columbia University and found to be sandstone, the largest part of which consisted of an aggregate of quartz grains cemented with calcium and iron carbonate, the rest being numerous laminated layers varying from as little as ⅛ inch up to a few inches thick of material cemented with iron oxide or bog iron. Approximately 36.5 percent of the rock was cementing agents with the rest being particles of sediment. It was a firm aggregate of cemented sand. Compressive strength of this stone ranged from 1,590 to 2,380 pounds per square inch. Typical sandstone, according to the authoritative Handbook of Physical Constants, ranges from 1,560 to 3,500 pounds per square inch.

This rock had the property of crumbling at the immediate point of impact but not transmitting stress so as to shatter. Grains of sand could be rubbed off this rock by application of a person's fingers. Because of its friability, this rock could be easily drilled, and the cuttings would be broken up into small particles, and when washed up in a drilling operation would appear to be uncemented materials if only visually examined. Such rock has considerable resistance to the kind of stresses exerted by heavy equipment used in excavation. The sand grains of this stone are completely unaffected by moisture and its cementing agents are practically insoluble in water. It would have no tendency to soften or weaken in water, but would have the same attri-

butes in its natural state as it did in a dry condition in laboratory testing.

These samples from elevation −42 represented material more difficult to excavate than the material of which samples were previously obtained at elevations −21 to −23.

52. On September 8, 1947, plaintiff telephoned the partner of the architect-engineer firm who had prepared the contract boring logs and supervised the preparation of the specifications, and advised him that excavation had generally reached elevation −46 and that it was almost physically impossible to remove any more material below that elevation. After consultation with his employee, the defendant's resident engineer, this partner returned the telephone call to plaintiff and advised that subject to an investigation to be conducted in a day or two, the defendant would accept a higher elevation for final grade than the specified −48. The bottom then ranged from a high of −42 to a low of slightly below −48. Plaintiff thereafter under instruction from defendant excavated the high areas to at least elevation −45, and completed the excavation by clean-up of loose materials from the bottom on September 12, 1947.

In the meantime the investigation had been conducted by defendant, and the excavation was accepted by defendant as complete when the average depth over the bottom was at −46.6. When excavation stopped, substantially the entire surface of the bottom of the cofferdam was hard sandstone.

53. On September 10, 1947, the same partner of the architect-engineer firm visited Pier 1–N to engage in the investigation concerning accepting higher grade than −48 for excavation of the cofferdam. He was then aware that plaintiff was contending that changed conditions had been encountered and would make claim for extra payment. The same day he prepared a memorandum report to the District Engineer, in which he advised that a decision had been reached, concurred in by the defendant's construction officer and other representatives of the defendant, that a higher level for the bottom of the excavation for Pier 1–N would be accepted, and further stated that he had advised plaintiff's president that this decision "did not, in any way, imply that we considered that 'changed conditions' had been encountered at the site; that it was based entirely on the

belief that an entirely satisfactory pier could be obtained without completing the excavation * * * and that since neither the Government nor the contractor would profit by any further work beyond such limits, we would agree to the modification which has been described."

In connection with the subject matter of changed conditions, he stated as follows:

> In my opinion the examination of the materials removed at and near the bottom of the excavation does not indicate a justification for claims for extra payment to the contractor for his excavation. Any materials encountered do not differ appreciably from those shown by or reasonably inferred from the borings. The samples of "12" rock" referred to by Fehlhaber in his conversations are not 12" at all. The greatest thickness which could be classed as rock, is 5", but even this was not really solid because of thin laminations of lightly cemented sand. In general, the rock thickness was observed to vary from about ¼" to 5" in thickness, but it would be utterly impossible to determine the average thickness of the rock because of variations in thickness of several inches which occur within areas as small as one square foot. Adhering to the rock, generally above and below it, are one or more layers of lightly cemented sand which can be broken easily by hand, and which could be excavated with the aid of a jet.
>
> The spud which Fehlhaber used to remove the rock was one of the H-piles, shaped at the bottom to form a cutting edge. It was merely dropped on the rock and was not driven with a hammer at any time.
>
> It should be noted that the lightly cemented sand tends to harden rather quickly in air, and in a few days time an undisturbed piece of it might assume the characteristics of sandstone. In order to prove this at some later time, Bruce is making an attempt to preserve a sample.

One of the samples of rock exhibited by plaintiff to this partner at the time of his investigation had an overall thickness of 12 inches of which about 8 to 10 inches was hard sandstone.

54. Under date of September 10, 1947, the defendant's construction officer and his assistant filed a report with the District Engineer concerning their investigation of claimed changed conditions at Pier 1–N, which report was in part as follows:

1. On 8 September 1947 the undersigned visited the site of the Chesapeake City Highway Bridge to investigate the contractor's allegation that changed conditions were being encountered at Pier 1-N.

2. It was noted that the contractor is encountering layers of sandstone up to 18" thick between elevations −43 and −47. Generally, the sandstone is easily friable and is difficult to call stone when freshly taken out of the excavation even though it comes out in lumps. This sandstone hardens when it becomes dry. This is a common characteristic of stone when removed from its natural deposit. (See Page 853 of Merriman and Wiggins Civil Engineering Handbook, Fifth Edition.). Interspersed with this soft layer of sandstone there is occasionally found a layer of brown sandstone from 4" to 6" thick. This brown layer has from visual observation all the characteristics of that which is commonly referred to as sandstone. The quantity of this brown material is small. Examination of excavation on the day of inspection and examination of the disposal area of the excavated material did not disclose any reason to believe that the total quantity of this brown sandstone exceeded 25 to 50 cubic yards. This brown stone is apparently what is reported on the borings included on the plans as bits of brown sandstone between elevations −45 and −52. It is surmised that in the process of making borings this material was not encountered in sufficient thickness to produce a core but broke up under the drill and was washed up as bits of small sandstone.

3. In excavating throughout this pier the contractor has not had to resort to any unusual methods. The material has been excavated by use of a jet and a claim [sic] shell bucket. This routine has only been departed from for the last week when the contractor from time to time broke up the brown sandstone by use of the spud as this sandstone could not be displaced by the jet. In conclusion, it is opiniated [sic] that the borings shown on the plans for Pier 1-N are accurate. It is not believed that any unusual conditions materially differing from those which could be anticipated in this excavation have been encountered nor is it believed that the contractor has had to resort to any unusual means to perform the specified excavation. Hence, it is concluded that no changed conditions have been encountered.

55. The sandstone which plaintiff encountered between elevations −37 and −46.6 consisted of recurring strata varying in thickness up to a maximum in some places of 18 inches,

with sand existing between the rock strata. In the western half of the cofferdam the rock strata occurred from elevation −37 to −46.6 and in the eastern half from −42 to −46.

This sandstone was formed in the sediment of estuarine deposits of the cretaceous age. The sedimentary deposits were highly cross-bedded, lacked parallelism, and rose and fell in pitch with respect to each other. The cementing agents, mainly calcium carbonate and iron oxide, which ultimately created sandstone in the sediments, were largely deposited by ground water, and because of the vagaries of ground-water activity due among other factors to fluctuation and varying porosity of the sands and other sediments, there was no uniformity in the deposition of cementing materials. From a geological standpoint the causalities concerning the deposition of cementing materials are so numerous and so variable that it would not be possible to predict the existence of cementation or the extent thereof at any particular location although such cementation occurred generally throughout large areas. The spasmodic and discontinuous deposit of cementing agents resulted in the formation of sandstone strata which varied rapidly in thickness, degrees of hardness, and in elevation within an area as small as that of the cofferdam at Pier 1–N.

56. The conclusion of the defendant's construction officer and his assistant, as well as that of the resident engineer, that only small quantities of sandstone were encountered by plaintiff at Pier 1–N was based upon their joint examination of a spoil pile located at the north abutment, on which area the approach road was to be constructed. This pile contained from ⅛ to ½ of all materials excavated from Pier 1–N, such materials having been placed under restrictions limiting the size of stone to be deposited there. At times this area was leveled by a bulldozer which tended to bury any stone in the pile. This spoil was not pulled apart on the investigation or at any other time, but the defendant's representatives made only a superficial examination except for some limited probing with a board at places. By this means, they concluded that approximately 25 to 50 cubic yards of brown sandstone, which they found to exist only in small pieces, with an occasional piece of cemented sand, had been excavated from Pier 1–N.

From ½ to ⅔ of the material excavated from Pier 1–N was deposited at three other locations to erect a berm on the canal-side of Pier 2–N, to backfill around other north piers, and to be wasted on a regularly established Government dump located approximately one mile from the job site. Photographs in evidence of both the 2–N berm and the regular Government dump taken after completion of excavation show on the surfaces of those areas substantial quantities of rock like that excavated from Pier 1–N.

57. The regular employment by the plaintiff of the heavy-duty jet and also the extensive use of the 2-ton H beam as a chopping bit were extraordinary procedures in the excavation operations in that they would not have been necessary had the subsurface conditions been as represented by the contract boring logs. Although two cranes were used by the plaintiff in the manner related above, plaintiff was able to excavate between elevations −37 and −46.6 only at an average rate of 32 cubic yards per shift, when the shifts varied from 8 to 10 hours in duration, or at a rate of less than one bucket of material every 15 minutes.

58. On July 3, 1947, the District Engineer visited the project site to investigate plaintiff's contention that it was encountering sandstone. This visit was prompted by plaintiff's letter of June 30, 1947, referred to in finding 36 above. On that occasion, he concluded that plaintiff was experiencing difficulty in excavation when he observed that the clamshell sometimes came up empty and the bucket was seldom able to pick up a pay load. He did not determine at what elevation the excavation was being conducted, and only observed the material as it fell from the clamshell bucket from just above the body of a truck.

59. The contracting officer, who was a military officer subordinate to the District Engineer, also visited the site on July 8, 1947, and spent 10 to 15 minutes observing the excavation operations at Pier 1–N. His visit was also prompted by plaintiff's letter dated June 30, 1947, claiming that on that pier sandstone had been encountered not shown on the contract borings. At this time excavation operations were proceeding somewhere between elevations −21 and −26 when a crane was casting from the west end of the cofferdam to a point in the east end, but trucks were not being loaded.

The contracting officer stood about 50 feet away on the bank of the canal, and his observation of materials was limited to their fall as the clamshell bucket opened about two feet above the water over the east end of the cofferdam. He concluded from the way the crane was digging, and from what he could see of the materials, that plaintiff was not excavating rock at that time. He was not aware that the bottom had been jetted throughout all of the preceding day, and excavation appeared easy to him because jetted materials were being removed.

By letter dated July 11, 1947, the contracting officer replied to plaintiff's letter dated June 30, 1947, accusing plaintiff of being opposed to the adoption of any suggestions to improve the rate of progress, and stating that there was no basis in fact to substantiate plaintiff's claim that sandstone was being encountered at Pier 1–N.

60. On July 16, 1947, when excavation at Pier 1–N was at approximately elevation −24, a conference was held with the District Engineer, the contracting officer, the partner of the artchitect-engineer firm, the resident engineer, and plaintiff's representatives regarding the progress of contract work and the withholding of progress payments. Plaintiff asserted that it was encountering rock at Pier 1–N and that conditions were different from those indicated by the contract borings. A heated discussion followed between plaintiff's president and the resident engineer, in which the resident engineer asserted that the only rock he had seen excavated from Pier 1–N was a single piece of granite riprap (which was entirely foreign as subsurface material in this area but had been allegedly represented as such by plaintiff's superintendent) and the "peanut-brittle" material which he claimed to have seen in connection with the 10-inch pipe test. Plaintiff's president asserted that the resident engineer was either unaware of the conditions or was deliberately withholding information. The resident engineer then knew and failed to state that on July 14 and 15 plaintiff had encountered 6-inch sandstone. His daily reports to the defendant for those days failed to reveal such fact, and his weekly report for the period ending July 19, 1947, mentioned only "lenses of sandstone". His personally kept diary of the project work, which he used to pre-

pare the daily and weekly reports, showed the encountering of 6-inch sandstone at Pier 1–N on July 14 and 15. In his testimony before this Court, he explained these discrepancies by stating that after the conference he returned to the project on July 17 and verified the encountering of 6-inch sandstone and then made the entries concerning the same in his diary for July 14 and 15. On this basis, the omission of such fact from the daily reports is reasonably to be explained by their preparation before change of the diary entries, but the resident engineer made no explanation for the minimizing of the description to "lenses" in the weekly report prepared on July 19.

61. On July 30, 1947, when excavation was at −24, plaintiff met the District Engineer at the plaintiff's job office near Pier 1–N, again asserted that sandstone was being encountered in excavating that pier, and showed various samples to him. These samples came from elevations −21 to −23 at Pier 1–N.

The samples were soft sandstone, varying in size from 8 inches to 3 feet in length and from several inches to one foot in thickness. When thrown to the ground from shoulder height some broke into a number of pieces, and others did not. One large piece taken from Pier 1–N, which was harder than any of the others and concerning which the District Engineer was advised by the resident engineer that its source was the bottom of the excavation for Pier 1–S across the canal, was struck with a 12-pound sledge hammer in the presence of the District Engineer and did not break. The District Engineer considered the samples as soft sandstone and remarked to plaintiff on this occasion that the material was not rock in a sense of difficult excavation.

The District Engineer did not examine any spoil areas to make any decision about rock being encountered at Pier 1–N. The contracting officer did make a casual observation of the spoil area at the north abutment.

On his visit of July 30, 1947, the District Engineer observed recasting of material from one end of the cofferdam to the other under circumstances similar to those existing when the contracting officer made his observations on July 8.

The District Engineer approved the higher final grade for the excavation at Pier 1–N because his subordinates ad-

vised him that plaintiff was having difficulty in excavating and there was adequate and suitable foundation at the depths reached.

62. On various but rather infrequent occasions, the District Engineer and the contracting officer briefly visited the project site. It is obvious from the entire record in this case that neither personally made any thorough investigation of claimed changed conditions, but relied upon information received from representatives of the defendant stationed at the project or assigned out of the District Engineer's office to make such investigations.

63. Plaintiff encountered in the excavation of Pier 1–N, sandstone of the nature described in findings 51 and 55 in such substantial quantities between elevations −37 and −46.6 as to constitute subsurface conditions materially differing from those indicated on the contract borings, which substantially prolonged the excavation work at Pier 1–N.

64. If the subsurface conditions at Pier 1–N had been as shown on the contract borings, plaintiff could have excavated with the equipment available at the site 200 cubic yards per 8-hour shift, and on this basis, the excavation of the 3,800 cubic yards required for Pier 1–N would have been accomplished in 19 shifts, or about 25 calendar days on a single shift basis.

The actual time taken for the excavation work was May 7, 8, 9, and June 9 through September 11, 1947, a period of 98 calendar days, during which plaintiff employed a total of 105 shifts, or an excess of 86 shifts.

Reasonable costs incurred by plaintiff on the excavation operations amounted to $6,755.61 for labor for the 105 shifts, and $14,290 for equipment use (including fuel) for the 98 calendar-day period, or total direct costs of $21,045.61.

These costs, being an average of $200.43 for each of the 98 shifts, amounted to a total of $17,236.98 for the 86 excess work shifts.

DRIVING H PILES AT PIER 1–N

65. The contract drawings required that 231 steel H piles, each 55 feet in length, weighing 89 pounds per foot, be driven within the cofferdam to support Pier 1–N, the spacing being generally about 3 feet apart in all directions, with 11 rows

running lengthwise of the cofferdam, 21 piles in each row. It was specified that each pile was to be driven at least 40 feet below the bottom of the excavation at −48, or to elevation −88, and until such pile attained a safe bearing load of 60 tons as determined by a specified formula with a hammer that developed a minimum of 19,000 foot-pounds of energy per blow.

The hammer used by plaintiff could produce 22,000 pounds of energy per blow.

The contract drawings further provided that the H piles would be driven so that their butt ends would project 8 feet above the bottom of the excavation, with the concrete footings, or tremie seal, to be poured between and over these projections. If a pile reached required resistance at the minimum depth at −88, the excess length of projection above the bottom of the excavation could be cut off. If the 55-foot pile was driven to maximum depth, its tip end would be 47 feet below elevation −48 or at −95.

The H piles were intended to provide point-bearing as well as skin friction resistance. The contract boring logs showed sandstone strata to exist in both borings at elevation −93, with a one-foot hard formation, indicated as a "possible sandstone stratum" at −90 in boring 1-NE.

66. According to the contract boring logs, there were no layers of sandstone between elevations −46 and −88 except one foot of sandstone between elevations −53.9 and −54.9 on boring 1-NW and one foot of soft sandstone between −50 and −51, and 1.7 feet of sandstone (from which a 6½-inch core was recovered) between −55.7 and −57.4 on boring 1-NE. From elevations −46 to −88, the latter elevation being the maximum depth to which any pile was driven, the boring logs showed the following descriptions of material:

Boring 1-NE

Elevation	Description
−42.4 to −50	Fine to medium gray-brown sand, with traces of clay.
−50 to −51	Soft sandstone.
−51 to −52.8	Fine to medium gray-brown sand, with traces of clay.
−52.8 to −53.7	Red clay, streaks of gray clay.
−53.7 to −55.7	Fine gray and brown sand.

Boring 1-NE—Continued

Elevation	Description
−55.7 to −57.4	Sandstone core 6½".
−57.4 to −64.1	Brown medium sand with streaks of light to dark gray sand.
−64.1 to −65	Medium gray clayey sand. Streaks of brown sand.
−65 to −79.7	Medium soft dark gray clay, with pockets and streaks of fine gray sand and silt.
−79.7 to −82.3	Fine light brown and gray clayey sand.
−82.3 to −93.	Fine light brown, light gray and yellow sand, traces clay. Hard formation, possible sandstone stratum. [Latter material at −90 to −91]

Boring 1-NW

−45.2 to −52	Fine to medium brown sand. Small particles of brown sandstone. Some clay.
−52 to −53.9	Mixed red and gray clay.
−53.9 to −54.9	Sandstone. No core.
−54.9 to −59	Very fine, extremely hard, light brown clayey sand.
−59.0 to −63.0	Very hard, fine to medium brown sand.
−63.0 to −63.5	Red sandy clay.
−63.5 to −72.5	Medium soft, light gray sandy clay and streaks of red sand.
−72.5 to −77.2	Medium hard gray clay with streaks of light sand.
−77.2 to −82.9	Mixed medium soft red and gray clay. Some fine reddish gray sand.
−82.9 to −83.4	Fine light gray sand.
−83.4 to −85.8	Medium yellow sand, pieces sandstone.
−85.8 to −86.4	Medium coarse light brown sand.
−86.4 to −87.7	Very hard yellow sand.
−87.7 to −90.5	Medium coarse white sand and light gray clay.

87. The materials described in the boring logs, both above and below the indicated sandstone, should not have been difficult for the piles to penetrate. The previously described resistances to the sampling spoon, recorded on the boring logs, did not suggest or reveal materials which would cause high resistances to H piles driven by a heavy and powerful hammer. The contract prohibition concerning use of a jet below the layer of rock at −55 was to prevent disturbance of what was indicated as unconsolidated sand below such sandstone.

The soft sandstone at elevation −50 in boring 1-NE and −53.9 in boring 1-NW would offer little, if any, more resistance to the H piles than the unconsolidated materials.

With respect to the sandstone at −55.7 in boring 1-NE the field party which conducted the boring operations had succeeded in recovering only a 6½-inch core from an indicated layer of 1.7 feet, which core was examined by plaintiff soon after the contract award in an early discussion about job procedure at the office of the previously mentioned partner of the architect-engineer firm. This core was hard sandstone, and the inquiry was made by the architect-engineer as to plaintiff's method of penetrating this layer. Plaintiff's observation then was that only a six and one-half inch core had been recovered and that a heavy hammer would cause the piles to break through such a layer without substantial difficulty. With the boring logs indicating unconsolidated materials underlying this sandstone layer from which only a six and one-half inch core had been obtained, plaintiff reasonably assumed when preparing its bid that no serious difficulty would be experienced in penetrating this layer and that generally the piles could be driven through all of the other materials without difficulty.

68. Plaintiff provided a reinforced steel pile which was used as a spud and driven at a number of the pile locations to shatter the rock. Thereafter the spud was withdrawn and the permanent pile inserted and driven at the same point.

To achieve the 60 tons of bearing capacity prescribed by specification 3-08c, defendant prescribed a formula based on the hammer and other equipment used by plaintiff, which called for resistance of each pile at the rate of 90 blows for the last foot after minimum penetration of 40 feet.

69. The driving of the H piles commenced at Pier 1-N on September 12, 1947, and was completed on October 29, 1947, with plaintiff employing 2 to 3 eight-hour shifts per work day except for an occasional single shift.

In the driving of the H piles, a template was laid across the cofferdam bracing, and a spud was then set up against the template as a guide to the pile and hammer, and the pile was then slid down along the spud and held in position by a foot block or gate at the bottom of the spud. The hammer was then threaded onto the spud by means of guide attach-

ments on the side of the hammer. The hammer had a special driving head which fitted over the top of the pile and was thereby allowed to come firmly to rest on the pile. With the pile held in driving position at the foot of the spud and by the hammer at the top, the pile was then driven by turning on the steam pressure.

70. Because the bottom of the excavation was irregular and almost entirely hard sandstone, the piles tended to "walk" or move out of position at the outset of driving, and the hammer was thereby caused to bind and lose some of its speed and energy. This required frequent resetting of the pile, and at several pile locations it was necessary to start with the preliminary driving of a reinforced spud pile.

Between elevations −46.6 and −55 plaintiff encountered rock in various parts of the cofferdam area as evidenced by such rock being contained in the flanges of some piles extracted before they had penetrated below such elevations. The materials were not sufficiently hard to require the exertion of more than 50 blows per foot within these elevations, except for 3 percent of the piles.

71. Between the elevations where it would have been reasonably expected from information furnished on the boring logs that a sandstone strata would exist, as indicated by a 1.7 layer of sandstone between elevations −55.7 and −57.4 on boring 1–NE and a one-foot layer between −53.9 and −54.9 on boring 1–NW, plaintiff encountered maximum resistances of 90 blows or less per foot on 178 piles, 91 to 180 blows per foot on 37 piles, and 181 to 399 blows per foot on 16 piles.

72. Below the above-described sandstone layer, the resistances to the piles generally increased to the extent that all but four of the 231 piles were driven at some elevation or elevations before reaching final grade at maximum rates in excess of 180 blows per foot. The four piles had maximum resistances between 91 and 180 blows, 85 piles between 181 and 399 blows, and 142 piles 400 or more blows per foot, all of which is shown by the defendant's record of pile resistances compiled at the time the piles were being driven.

Resistances to the piles varied to the extent that some piles were driven at no greater rate than 90 blows per foot until they reached high resistances in the last foot or two of driv-

ing, other piles met high resistances through all or most of their driving below the sandstone layer indicated on the contract boring logs, whereas most of the piles intermittently attained high resistances at recurring but varying elevations and for varying depths. Despite such variations, a pattern of high resistances existed between elevations −58 and −64 and again between −72 and the maximum depth to which the piles were driven, which in the main ranged from −81 to −88. Graphic illustrations of the resistances encountered on each pile through each foot of penetration, which were based on defendant's record of pile resistances are in evidence as plaintiff's exhibit 83, and are included as a part of these findings of fact as if fully set forth.

73. Very high resistances were experienced between elevations −59 and −61, where 94 of the 231 piles drove at rates in excess of 100 blows per foot. Of the 94, 39 drove in excess of 200 blows; of the 39, 27 in excess of 400 blows; of the 27, 10 in excess of 1,000 blows; and of the 10, one (a spud pile) in excess of 3,000 blows per foot.

From elevation about −72 to the maximum depths to which the piles were driven, varying in the main between about −81 and −88, 218 of the 231 piles encountered maximum resistances at one or more points within such elevations at rates of 181 to 399 blows per foot, and of the 218, 125 were driven at some elevation or elevations at rates of 400 or more blows per foot. Within such elevations, some piles encountered these high resistances for only the last foot or two of driving, whereas a substantial number were driven at these high resistances for varying depths from 3 feet to 8 feet, with one pile for 12 consecutive feet.

74. Because of the high resistances encountered, defendant devised a formula by which it determined that the H piles could undergo driving resistance at a rate of 400 blows per foot before the pile would be structurally damaged. The basic premise was that blows in excess of that amount meant that the pile was encountering a stratum of rock hard enough to damage the pile. A pile having a resistance at maximum penetration of 400 blows per foot possessed a bearing resistance in excess of 200 tons. Where the driving exceeded 400 blows before acceptable depth had been reached, the

planned procedure was to abandon such pile for later extraction and resume driving elsewhere.

By October 13, 1947, plaintiff had driven all but 36 of the piles, and 13 of these had encountered 400 blows or more per foot within elevations −58 to −62 when abandoned for later extraction, with the remaining 23 not reasonably to be driven until the condition of the 13 had been ascertained. The extraction of the 13 commenced on this date. Actually, 12 other piles were driven through elevations −59 to −61 without extraction, despite resistances in excess of 400 blows, by the employment of either the spud pile or reinforced piles. Twenty-eight of the last 36 piles driven were reinforced at the tip and butt by adding a plate to the flanges and web at each end, and the other eight piles were driven after a reinforced spud had been used to break through the rock strata.

Examination of the extracted piles showed their tips to be shattered and their flanges split, torn and twisted for varying distances from one or two feet to 8 or 10 feet. In some instances 5 to 7 feet of rock were imbedded in the flanges of the extracted piles.

75. In some instances the excessive driving caused the butts of piles to become battered to the extent that they had to be cut off to avoid wedging of the anvil of the hammer. This occurred notwithstanding the fact that the hammer was equipped with a driving cap which fitted over the butt of the pile.

76. On October 14, 1947, Professor Briggs returned to the project and observed the piles extracted on the previous day. In his presence, the battered flanges of one of them were cut away, and six or seven feet of sandstone removed therefrom. A 3-pound specimen, which came from about elevation −60 was selected by him and shipped to Columbia University for analysis. This specimen was similar to the rock contained in the flanges of the other extracted piles.

When subjected to examination and test by a qualified geologist at Columbia University, this sample was found to be a conglomerate sandstone consisting of dark brownish to greenish-red grit, with pebbles up to one-half inch in diameter, very firmly and thoroughly cemented by bog iron and by iron and calcium carbonate. The compressive

strength of this rock was 34,400 pounds per square inch, or 50 percent stronger than average granite.

77. Because of the very high resistances encountered at the lower elevations of driving, the H piles could not be driven even to the specified minimum of 40 feet of penetration. The average penetration of the 231 piles was 35.5 feet below the bottom of excavation at −46.6, with the eight highest of the piles being driven only 26 to 29 feet. Instead of reaching the minimum depth at elevation −88 as contemplated by the specifications, the piles penetrated to an average elevation of −82, with the highest at −72.7 and the lowest at −88 and with about 188 of the 231 penetrating to points between elevations −80 and −84.

The defendant was fully informed as to the elevations and the resistances encountered and accepted the piles at the elevations to which they were finally driven.

78. From the commencement of the pile driving operations, plaintiff repeatedly advised the defendant that rock was being encountered from elevation −46 to a depth of from 25 to 30 feet. In keeping the records of blows per foot on each pile at each elevation, defendant was fully aware of the high resistances which strongly inferred the presence of hard rock at elevations where none was shown by the contract borings.

The defendant's District Engineer and its contracting officer made only casual and infrequent observations with respect to the difficulties being encountered in the driving of the H piles, but relied heavily on the architect-engineer firm and its employee, the defendant's resident engineer, for advice as to whether changed conditions existed.

In the driving of the H piles at Pier 1–N, plaintiff encountered subsurface conditions substantially and materially differing from those shown by the contract borings.

79. Had the subsurface conditions been as shown by the contract borings, plaintiff with the equipment which it had at the site, could have driven at least seven piles per 8-hour shift, and thus have driven all 231 piles in 33 8-hour shifts.

The actual time required was 48 calendar days during which plaintiff utilized 77 8-hour shifts, or an excess of 44 shifts required by the changed subsurface conditions encountered.

Reasonable costs incurred by plaintiff on the driving of the H piles amounted to $14,260.59 for labor for the 77 shifts. Heavy use of equipment was made during the 48 calendar-day period of these operations, and reasonable costs incurred by plaintiff for equipment use (including fuel) amounted to $17,255. These costs amounted to $31,515.59 for the 77 shifts.

With the average of such costs being $409.29 for each of the 77 shifts, the total reasonable amount of such costs for the excess 44 shifts amounted to $18,008.76.

Had the subsurface conditions been as represented, the pile driving would have been accomplished in 41 calendar days on a single shift basis, whereas actual operations extended over 48 calendar days with multiple shifts.

LIQUIDATED DAMAGES

80. Commencing in October 1947 and thereafter from time to time through August 1948, in connection with periodic payments for work performed, defendant deducted from sums otherwise determined due to plaintiff, various amounts as liquidated damages for delay in performance. The successive deductions at the rate of $200 per day accumulatively represented the extent to which plaintiff's total time of performance up to the end of a particular payment period, exceeded in calendar days the contract performance time as extended by defendant. As further extensions of time were allowed, adjustments in the amounts withheld were made accordingly. By the time of the payment made August 25, 1948, covering performance between July 15 and August 15, 1948, defendant had withheld the accumulated net amount of $45,800 as liquidated damages for 229 calendar days of delay beyond December 30, 1947, the contract completion date as last extended.

In February 1949 defendant refunded $32,000 of these withheld funds because of the 160 calendar-day extension allowed by defendant on January 19, 1949, for acute labor shortages.

In October 1949, defendant refunded an additional sum of $3,800 covering 19 calendar days after July 27, 1948, the date treated by defendant as the actual contract completion day. After all refunds, the sum of $10,000 was retained by

defendant, as liquidated damages covering the 50 calendar-day period of time after June 7, 1948, the contract completion date as extended by defendant, and July 27, 1948.

81. Upon executing and submitting the public voucher for the last refund of liquidated damages in the sum of $3,800, plaintiff in writing reserved all of its claims in the following language:

> By this reservation we wish it understood that in accepting the amount set forth in this voucher we do not waive, and that we fully reserve, all of our claims for increased costs resulting from the performance of this work, our claim for the remission of liquidated damages, as well as our claim for reimbursement of funds expended on the Schaefer suit.

Similar language was used by plaintiff in connection with each voucher for partial payments, on which a deduction had been made on account of liquidated damages.

82. At a conference held December 1, 1947, attended by plaintiff, the District Engineer commented that he was anxious to avoid the assessment of liquidated damages, and the defendant's contracting officer replied that an extension of time could not be granted without placing defendant in the position of admitting the plaintiff's pending claim that delay was caused by changed conditions at Pier 1–N.

Shortly after December 3, 1947, on which date the contracting officer issued his letter of denial of plaintiff's claim of changed conditions at Pier 1–N, the District Engineer became the successor contracting officer, and it was he who granted the extensions of time of 49 calendar days for bad weather and 160 calendar days for labor shortage, which extensions alone amounted to more time than the original contract period. The supporting facts and circumstances for such extensions are only superficially mentioned in this record. When cross-examined concerning the basis for the labor-shortage extension, the District Engineer reluctantly admitted in effect that the 160-day extension could not be justified and that he was endeavoring to find a way to avoid the assessment of a substantial amount of liquidated damages.

83. Plaintiff was delayed by changed conditions at Pier 1–N for a period of 30 calendar days in the driving of the

sheet piles for the cofferdam, for 73 days in excavating for the pier base, and for 7 calendar days in the driving of the H piles, or a total of 110 calendar days.

Plaintiff requested defendant to allow a 151 calendar-day extension on account of such changed conditions, but no extension was ever allowed.

84. The only detailed evidence in this record concerns the pertinent operations at Pier 1–N, with only casual and superficial references to the other piers or to the project as a whole. Both parties deliberately endeavored to limit the evidence to Pier 1–N.

Throughout the contract performance, the defendant's representatives repeatedly criticized plaintiff for lack of sufficient equipment and for poor planning and coordination of the project as a whole.

The evidence is not sufficient on which to base any finding that changed conditions at Pier 1–N caused an overall delay of the entire project.

OVERHEAD AND OTHER ADDITIONAL COSTS

85. Plaintiff contends that in addition to the excess costs which it incurred in direct connection with the construction of the cofferdam, excavation for the pier base, and driving of the H piles at Pier 1–N, it incurred additional costs of an indirect nature which it identified by name and amount as follows:

Additional Field Costs:		
Field Office	$12,737.25	
Batching plants	38,584.05	
		$51,321.30
Employees Room and Board		805.00
Overhead Expense		21,202.85
Total		73,328.65

86. In connection with the operation of the field office at the project, plaintiff had a superintendent and other straight time and regular employees who were paid on a weekly basis, such employees being required to remain assigned to the project as long as there was any work to be done. These employees were paid a total of $462 per week, on which payroll insurance at a rate of 9.96 percent, or $46.02 per week,

was paid. Two of these employees, including the superintendent, received allowances for room and board amounting to a total of $66.25 per week.

Plaintiff necessarily maintained a job truck and a job boat at the project throughout the performance, at reasonable costs of $100 per week for the truck and $75 per week for the boat.

The total costs of these fixed items was $749.27 per week, or on the basis of a 5 work-day week, $149.85 per day.

87. The specifications contained the following provision with respect to batching and mixing of concrete:

> 1–10 BATCHING AND MIXING.—*a. Equipment.*—The contractor shall provide at the site of the work two (2) or more modern and dependable batch-type mixing plants. The plants shall be so located and arranged that a minimum plant-capacity of 1,000 cubic yards of concrete per 8 hours is made available and ready for use on the same side of the canal as the pier during the placing of each separate lift in either main pier base. (1N and 1S.) The remaining plant capacity shall be available for immediate use, if necessary, to maintain a continuous rate of pour of 85 cubic yards per hour. The available plant shall include not fewer than two (2) complete mixers with separate power plants. The equipment shall be capable of combining the aggregate, cement, and water into a uniform mixture and of discharging this mixture without segregation.
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> * * * * * *
>
> (8) The mechanism for delivering water to the mixers shall be such that leakage will not occur when the valves are closed. * * *

Plaintiff did not provide the batch-type mixing plants but instead two batching plants each possessing a capacity of 500 cubic yards per 8-hour day, one of which was located on the north side of the canal and the other on the south side of the canal. The batched aggregates were discharged into transit-mix trucks, and the concrete mixed on the way to the point of deposit. No objection was ever made by any representative of the defendant to the batching plants and concrete equipment employed by plaintiff, or the combined use of both plants for a pour on one side of the canal.

The largest continuous pours to be made under the contract were the two tremie pours for Piers 1–N and 1–S, each lo-

cated at the bottom of the pier excavation about and just above the pile projections, and plaintiff by use of both batching plants during each operation succeeded in maintaining a continuous rate of pour of 85 cubic yards per hour, or 680 cubic yards per 8-hour shift. Except for these two tremie pours, each plant was used to service pours on the various piers and the abutment on the same side of the canal.

The average daily reasonable cost incurred by plaintiff on account of the two batching plants was $453.93.

88. In its claim for additional field costs, plaintiff combined the daily costs of field office expense and batching plants and arrived at a total daily cost of field expense of $603.78. Plaintiff applied this rate to 85 working days which it derived from 118 calendar days, the alleged total excess time required to perform the sheeting and bracing, the excavation and the H pile driving operations at Pier 1-N.

These claimed 118 calendar days occurred within the period February 20, 1947, to October 29, 1947, during which time work was being prosecuted throughout the entire project. The daily reports of the resident engineer show that during this time concrete pours were conducted on most of the piers of the project.

The evidence is not sufficient to support any finding that plaintiff's field costs for field office and batching plants were increased in the above-stated period because of changed conditions at Pier 1-N, or that such costs were increased by any overall delay in completion of the entire project, caused by such changed conditions at Pier 1-N.

89. During the course of the contract performance sufficient skilled labor in the immediate area was not available and plaintiff was required to recruit employees from New York and other areas and pay their room and board.

It is not shown in evidence that these employees were engaged to work solely at Pier 1-N, or that their period of employment was confined to the time when changed conditions were encountered there. It is established that during this period two of these employees were detained at Pier 1-N at times when they could have been assigned to other work.

The excess costs thus incurred by plaintiff by changed conditions at Pier 1–N on account of employees' board and room was the reasonable sum of $345.

90. The fairly allocated amount of plaintiff's general overhead on all of its business to the pertinent project was the sum of $5,395 per month. By applying this monthly sum to the claimed 118 calendar-day period, which is equivalent to 3.93 months, plaintiff requests the sum of $21,202.35 as general overhead cost.

These claimed 118 calendar days occurred when work was progressing on the whole project. No overall delay of the entire project is shown to have been caused by changed conditions at Pier 1–N.

A fair and reasonable allowance for general overhead expenses would be 10 percent of the total excess of direct costs caused by changed conditions encountered on the three pertinent phases of the work at Pier 1–N.

SUMMARY OF DAMAGES

91. In the performance of the work required for the construction of Pier 1–N, plaintiff incurred reasonable excess costs caused by the above-described changed conditions, as follows:

Sheeting and bracing	$5,709.22
Excavation	17,236.98
Driving H piles	18,008.76
Employees room and board	345.00
	41,389.96
Overhead expenses at 10%	4,139.00
	45,528.96

In the allowances of additional sums of money for changed conditions on other piers, defendant allowed 10 percent of the increased costs for profit, and on the costs summarized above, such allowance for profit would amount to $4,552.90 for a total sum of $50,081.86.

Plaintiff would be further obligated to pay an additional amount of premium to its bonding company for bonds furnished as required by the contract and specifications at a rate of .665 percent of the $50,081.86, or $333.04.

Total damages amount to $50,414.90.

92. On September 12, 1947, plaintiff wrote the defendant as follows:

> In view of the fact that the excavation work in Pier 1–N will be completed shortly, we wish to, at this time, confirm in writing the writer's oral statements to both Major Albert J. Ryan and Captain Louis Caccese that the materials encountered in Pier 1–N are considerably different than those shown on the plans, and that we will file a claim for our excess costs in accordance with the article in our contract headed "Changed Conditions".
>
> As soon as the excavation work is completed, we will immediately commence correlation of these said costs, and also substantiation of our claim, and submit to you for your approval.

93. The contracting officer, who was a military officer subordinate to the District Engineer, having been advised by defendant's representatives that only thin layers of sandstone had been encountered at Pier 1–N, sent the following letter to plaintiff, dated September 15, 1947:

> Reference is made to your telephone conversation of 4 September 1947 to this office in which you alleged that changed conditions were being encountered at Pier 1–N. This is to advise that our investigation does not disclose any evidence of changed conditions within the conditions as set forth in Article 4 of the contract.
>
> This office has not received your formal written contentions upon which you base your allegation. Should you intend to prosecute your allegation, it is suggested that you submit your contentions as to the changed conditions encountered at Pier 1–N, together with the amount of your claim, within the next 30 days as specified by Article 15 of the contract.

94. By letter dated October 3, 1947, plaintiff stated to the District Engineer's office that subsurface conditions materially differing from those shown on the contract drawings had been encountered at Pier 1–N, enclosed a statement concerning excess costs thereby caused in setting and driving steel sheet piling and excavating for the pier base, and also requested an extension of contract performance time of 115 days.

95. By letter dated October 10, 1947, plaintiff submitted additional claimed costs on the sheet piles and excavation,

relating to changed conditions at Pier 1–N, and requested a conference.

96. On October 14, 1947, the District Engineer by letter requested plaintiff to submit cogent reasons to support its allegation of changed conditions, stating that prior to the submission of such material a conference would be premature.

97. Replying to the letter summarized in the preceding finding, plaintiff by letter dated November 5, 1947, stated as follows:

> Our claim is based on the fact that we encountered, "during the progress of the work sub-surface and/or latent conditions at the site materially differing from those shown on the drawings or indicated in the specifications". This claim is borne out by the sub-surface conditions as actually encountered; and is further borne out by the laboratory analysis of the materials encountered; and by the design changes necessitated by these changed conditions and so authorized by your architect-engineer.
>
> To be more specific, boring 1–NE shows, at elevation −18.7 to elevation −26.9, that we should expect fine white sand and clay and fine yellow clay sand, and boring 1–NW, at approximately the same elevations, shows that we should expect a soil of similar composition.
>
> When the pier was excavated, instead of soil of this composition, we encountered an exceedingly hard material, and after forwarding samples of this material to the Soil Mechanic's Laboratory at Columbia University for analysis and classification, we were advised that this material could not be classified as a soil, and if any analyses were to be made, they would have to be made by a geologist.
>
> Similarly, at elevation −37, extending to and beyond the original proposed bottom of the cofferdam, we again encountered a similar material, and an examination of borings 1–NE and 1–SE indicates that we should have encountered sand with traces of clay, yet this material was so compact that it was impossible to excavate it.
>
> We were then directed to raise the bottom elevation of the tremie seal, because of the impracticability of excavating this rocklike material.
>
> Will you, therefore, kindly arrange for a conference on this subject at your earliest possible convenience?

98. On November 17, 1947, plaintiff sent to defendant a geological report which included the results of certain com-

pression tests made on materials recovered within the disputed areas at Pier 1–N.

99. By letter dated November 25, 1947, plaintiff submitted to the District Engineer its claim for additional compensation covering the driving of H piles at Pier 1–N, asserting that the claim was based on Article 4 of the contract and that the piles were not driven the minimum depth of 40 feet because that specification was changed by defendant's architect-engineer for the reason that the materials encountered made it physically impossible of execution. In connection therewith, plaintiff requested a further extension of time for project completion of 36 days, and also referred to the geological reports previously submitted.

100. On December 1, 1947, plaintiff conferred with the District Engineer, the contracting officer, the partner of the architect-engineer firm, the resident engineer and others. At that time, the parties discussed changed conditions at Piers 1–S, 13–S and 14–S. Plaintiff then submitted a geological report on materials excavated from 1–S, prepared by the same experts who tested materials from Pier 1–N, which asserted that the materials tested were different from those indicated on the contract drawings, and over the denial of changed conditions by the partner of the architect-engineer firm, plaintiff was later paid for changed conditions at Pier 1–S.

Because the part of plaintiff's claim on Pier 1–N, concerning H pile driving, had just been received, Pier 1–N was discussed only briefly at this conference. The amounts of plaintiff's Pier 1–N claims were $54,744.65 for sheet piling and excavation, and $23,495.40 for H pile driving. The defendant's representatives stated that the payments for changed conditions had been nominal in amount on other piers and asserted that such large amounts would not be paid on 1–N.

101. By letter dated December 3, 1947, the contracting officer denied plaintiff's claim for changed conditions at Pier 1–N, as follows:

> Your claims for driving of sheeting, excavation and driving of piles at Pier 1–N in the amount of $78,240.05, together with your supporting evidence as contained in your aforementioned letters, have been considered.

As a result of this consideration, the contracting officer has decided that conditions encountered at Pier 1-N were not subsurface and/or latent conditions at the site materially differing from those shown on the drawings or indicated in the specifications, or unknown conditions of an unusual nature differing materially from those ordinarily encountered and generally recognized as inhering in work of the character provided for in the plans and specifications; and, therefore, your claims for additional compensation at said pier are disapproved.

Your attention is invited to Article 15 of the contract which allows a 30 day period in which to appeal from the above decision.

102. On December 30, 1947, plaintiff advised defendant that it would supply two further affidavits in support of its claim, reserving all rights under Article 15 pertaining to appeal, and on January 9, 1948, plaintiff was advised by defendant that upon receipt of the affidavits the claim would be considered further and forwarded to higher authority for determination. The affidavits were filed with the defendant on February 3, 1948.

103. The District Engineer thereupon requested the architect-engineer to review plaintiff's claims and on February 5, 1948, the architect-engineer advised the District Engineer as follows:

Our review discloses no reasons for changing the conclusions which are contained in our letter of November 26, 1947 to you on this subject. We might add that the evidence at hand indicates that the very thin layer of sandstone which was found over a portion of the area of the cofferdam near Elevation −21 had an entirely negligible effect on the costs of performing the work at this pier and could not be construed as a changed condition.

In our opinion, the Contractor is not entitled to additional compensation, and we recommend that the claims be disallowed.

104. Under date of March 1, 1948, the District Engineer executed and transmitted to plaintiff written findings of fact concerning changed conditions at Pier 1-N, which, after setting forth pertinent provisions of the contract and specifications and making reference to the contract boring logs, provided as follows:

3. The contractor alleges that subsurface conditions materially differing from those shown on the drawings or indicated in the specifications were encountered at Pier 1–N and, therefore, he is due $78,240.05. (See contractor's letters dated 10 October 1947 and 25 November 1947, copies attached as Exhibits A and B, respectively).

The contractor has supported his allegations by:

(a) Report of Wesley Briggs, C. E., dated 14 November 1947. (Said report is attached as Exhibit C.) This report concludes with the allegation that borings shown at Pier 1–N should be termed incorrect at elevation −21 plus or minus, at elevations −37 to −45, and at elevation −60. This conclusion is based on the interpretation of laboratory findings made on samples selected, shipped and reported as coming from the various elevations by the contractor or his representative.

(b) Two affidavits stating that rock was encountered between elevation −21 and −26 and from −37 to the bottom of the cofferdam and that the jet pipe was used as a chopping bit. (See Exhibi. D, attached.)

4. The Government does not agree with and contends the contractor's allegation regarding the materials encountered in the excavation because of the following:

(a) Only small quantities of materials which are generally recognized as rock were encountered in the excavation. Quantity encountered was so little and so dispersed as to make accurate quantitative measurement impractical. The estimate of the Resident Engineer on the job and Government observers of the rock encountered was less than three per cent by volume of the total excavation. This estimate is based on observation of the actual excavation and the disposal areas. The amount of rock encountered is not considered unusual and should have been anticipated. The presence of some rock in the area of excavation was indicated by the borings as follows:

Boring 1–NE—Elevation −50 Soft Sandstone Strata
Elevations −55.7 to −57.4 Sandstone Strata

Boring 1–NW—Elevation −43.5 Soft Sandstone Strata
Elevations −45 to −52 Small Particles of Sandstone
Elevations −53.9 to −54.9 Sandstone Strata

(b) The bulk of material encountered in the excavation of Pier 1–N consisted of sand possessing some cohesion because of a cementing agent present. This material was easily displaced and loosened by jetting. Generally, solid pieces which were retrieved were easily friable and fragile but when permitted to airdry increased in hardness and toughness. Specimens tested by

the contractor were air dried and hence not indicative of the materials in the state encountered.

(c) Evidence that no unusual condition and that no substantial quantity of rock were encountered is found in the fact that all excavation down to approximate elevation −45 was removed without employing any of the methods which would be necessary and commonly expected for the removal of rock. Excavation to approximately elevation −21 was made by use of clamshell bucket. Between elevations −21 and −45 the assistance of a jet to loosen material was employed. At approximate elevation −45 a spud was put in use to break up thin rock strata. The excavation at Pier 1–N took place during the period 16 June 1947 to 11 September 1947, inclusive. Until 7 July 1947 excavation was accomplished by use of clamshell bucket alone. On 7 July 1947 and thereafter jetting was employed to assist the clamshell bucket. On 2 September 1947 and until completion of the excavation on 11 September 1947 a spud was used to break up the thin rock strata encountered at approximate elevation −45.

(d) Laboratory tests conducted by the contractor are not considered as representative. At the time contractor was selecting samples, it was reported by both the Resident Engineer and Government representatives viewing the work that specimens being selected by the contractor were not representative. The samples tested by the contractor were air dried and aged before testing as can be noted from Mr. Briggs' report. Again it was noted by the Government prior to the time tests were made that materials taken from the excavation were subject to considerable hardening upon drying. This is not an unusual characteristic of material which has a cementing agent present and does not alone justify the classification of such material as rock.

(e) The contractor, and the report of Mr. Briggs, nowhere indicates the estimate of the quantity of sandstone encountered. Detailed review of Samples Nos. 1 and 3 of the report of Mr. Briggs, which were the ones retrieved from the excavation, supports the Government contention that the hardest materials encountered in the excavation only existed in thin layers which were surrounded by sand having a cementing agent present. This sand in its natural state was loosely cemented but was subject to very pronounced hardening on drying. The very pronounced hardening encountered in this instance is explained on page three of Mr. Briggs' report wherein he points out the unusually large amount of

cement agent present. The cementing agent is the constituent which hardens on drying.

(f) Specific comments on samples upon which Mr. Briggs has reported follow:

SAMPLE No. 1.—The actual character of material excavated at and around elevation −21 is manifested by the fact that it was all excavated by clamshell bucket and jetting. The material from the neighborhood of elevation −21 was observed by the District Engineer and Mr. Fehlhaber on 30 July 1947, and upon the District Engineer's return he saw fit to write into the files of this office: "I saw this material, and it is not rock. It broke into many fragments when dropped on the ground. There were, however, a few solid pieces."

SAMPLE No. 2—taken from an H beam which had been driven to elevation −60 and subsequently pulled. Accordingly, the exact elevation at which this sample existed is indeterminate. Sandstone was reported on the borings shown on the contract drawings at elevations −55 and −57. Bidders' attention was invited to the presence of a sandstone layer around elevations −55 and −57 in paragraph 3-08(c) of the specifications as this was a layer which the Government presumed prior to the execution of the work would require special equipment to penetrate.

SAMPLE No. 3—Sample reported as being taken from between elevations −37 and −45. This sample was not representative of material between −37 and −45. It was noted in the Resident Engineer's report on 5 September 1947 and a field inspection by District personnel on 10 September 1947 that test specimens being selected were not representative of general run of material. It was further observed that the test specimens which were selected by the contractor were retrieved between elevations −42 and −45. Mr. Briggs points out the unusually high amount of cementing material in this specimen. This should be carefully noted. It is the cementing agent which gives the stone the property of aging or hardening as it dries out after being removed from its natural deposit. This explains the extraordinary increase in hardness of this material after removal from its natural deposit.

The material in the area from which this sample was taken is shown on boring 1-NW as soft sandstone at elevation −44 and small particles of sandstone between elevations −45 and −52. Difficulty in excavating this material should have been anticipated from the 195 blows per foot on the sample spoon which were re-

corded on boring 1–NE as shown on the contract drawings immediately below elevation −42.4.

The Architect-Engineer in his opinion on the contractor's allegations of the materials at the lower elevations of the cofferdam stated:

> An examination of the materials removed at and near the bottom of the excavation does not indicate a justification for claims for extra payment to the contractor for his excavation. Any materials encountered do not differ appreciably from those shown by or reasonably inferred from the borings. The samples of "12" rock" referred to by Fehlhaber in his conversations are not 12" at all. The greatest thickness which could be classed as rock is 5" but even this was not really solid because of thin laminations of lightly cemented sand. In general, the rock thickness was observed to vary from about ¼" to 5" in thickness but it would be utterly impossible to determine the average thickness of the rock because of variations in thickness of several inches which occur within areas as small as one square foot. Adhering to the rock, generally above and below it, are one or more layers of lightly cemented sand which can be broken easily by hand and which could be excavated with the aid of a jet.

5. The contractor further alleges that a manifestation of the changed conditions encountered is found in the fact that:

(a) They were "directed to raise the elevation of the tremie seal because of the impracticability of excavating this rocklike material." (See contractor's letter dated 5 November 1947, Exhibit E, attached).

(b) "The specifications clearly state that piles shall not be driven less than 40 feet. This requirement was changed by your Architect-Engineer for the reason that the materials encountered made it impossible of execution." (Contained in contractor's letter dated 25 November 1947, attached Exhibit B.)

6. The Government denies that the above allegations offer evidence of changed conditions because of the following:

(a) Plans show cofferdam to be excavated to bottom elevation of −48. Inasmuch as firm bottom had been encountered at somewhat lesser depth the contractor was given permission, in compliance with his request, to consider the excavation complete when average bottom elevation of −46.5 feet had been obtained and the bottom was reasonably level and free of loose material.

This permission was granted solely because it was determined that a suitable foundation was reached at that elevation, and that further excavation was unnecessary.

(b) Specifications provided that piles at Pier 1–N would be paid for at a lump sum per pile and that piles would be driven to a load carrying capacity of 60 tons and driven a minimum of 40 feet. In the field it was found that pile capacity was obtained at lesser penetration than 40 feet. Continued driving to attain 40 feet would subject the piles to the possibility of damage by overdriving whereas no necessary increase in capacity would be obtained. Accordingly, some piles with as low as 27 feet of penetration were accepted. Average penetration of piles was 35.5 feet.

7. The consulting engineer firm, Parsons, Brinckerhoff, Hogan & MacDonald, who are employed on the supervision of construction of this project have considered the contractor's allegations and state in their opinion no changed conditions were encountered at Pier 1–N.

8. *Conclusions of the Contracting Officer.*—The Contracting Officer has concluded that:

(a) The original borings shown on the contract drawings have not been disproved and must be assumed to be correct.

(b) The material encountered in the excavation of the cofferdam was principally sand with a small quantity of rock. This is what would be reasonably inferred from a study of the borings appearing on the contract drawings. Accordingly, no conditions materially different from what should have been anticipated were encountered in the execution of the excavation at Pier 1–N.

(c) The fact that some modification was made in the accepted elevation of excavation and accepted length of H piles is not sufficient basis to constitute changed conditions nor did it cause the contractor to incur any additional expense.

Accordingly, it is decided that the contractor is not entitled to extra compensation because of the work at Pier 1–N.

9. The following additional information is presented:

(a) No attempt has been made to check the amount of the contractor's claim inasmuch as the existence of changed conditions has not been acknowledged.

(b) Samples of material excavated from Pier 1–N have been preserved to be used for future testing should it be decided that such data are necessary in considering the contractor's claim. The samples have been immersed in water to prevent aging.

105. On March 18, 1948, plaintiff took an appeal under the "Disputes" article of the contract, and after a hearing had been held, the Corps of Engineers Claims and Appeals Board under date of February 15, 1949, disallowed plaintiff's claim in a written decision and opinion. On February 25, 1949, the findings of fact, views and conclusions of this board were approved and the plaintiff's appeal denied by the Chief of Engineers, who was the duly authorized appellate authority. On March 14, 1949, plaintiff was advised of the action taken on its appeal.

The pertinent parts of the findings of fact and decision of the appeal board are as follows:

OPINION

Appellant seeks to recover additional compensation for setting and driving steel sheet piles, excavation and driving steel H-beams because of unknown conditions of an unusual nature differing materially from those ordinarily encountered and generally recognized as inhering in work of the character provided in the plans and specifications within the meaning of Article 4, quoted in the statement of facts above. Specifically, appellant claims to have encountered rock at Pier 1–N at elevations −18.7 to −26.9, at elevations −37 to −45, and at elevation −60, all of which is stated to have increased the contractor's cost.

Pier 1–N being located in the channel of the Chesapeake & Delaware Canal necessitated construction of a cofferdam 75 feet long and 45 feet wide. The cofferdam was constructed with interlocking steel piles, supported by interior steel walers and bracing struts. Bracing struts divided the area into ten cells through which the work was carried on. After the excavation reached progressive stages, the walers were lowered and left at the required position. Under the specifications, excavation was required to be carried on to elevation −48, to which the footings were to be founded. Inasmuch as suitable bottom was encountered at a somewhat lesser depth, the contractor was given permission, in compliance with his request, to consider excavation complete when the average bottom elevation of −46.5 had been obtained and the bottom was reasonably level and free from all loose material. The material was excavated by clamshell bucket and jetting.

The specifications provided that steel piles at Pier 1–N would be paid for at a lump sum per pile and that the

piles would be driven to a load-carrying capacity of 60 tons and driven to a minimum of 40 feet. In the field it was found that pile bearing capacity was obtained at lesser penetration than 40 feet. Accordingly, some piles with a penetration as low as 27 feet were accepted, the average penetration of piles being 35.5 feet.

Because a firm foundation for Pier 1–N was found at average elevation −46.5, and because 60 ton bearing capacity was obtained by driving steel piles to an average penetration of 35.5 feet, appellant contends that the reduction in these elevations was indicative of the impracticability of excavating this "rock-like" material. Concerning this contention, the testimony adduced at the hearing indicated the bulk of the material excavated consisted of sand possessing some cohesion because of a cementing agent.

Appellant's construction superintendent, at a hearing accorded the contractor, corroborated an affidavit executed by him describing the conditions encountered as follows:

I Aaron Burros, being duly sworn, deposes and says:

I am the superintendent for the construction of the substructure of the Chesapeake & Delaware Canal Highway Bridge at Chesapeake City, Md., employed by the Fehlhaber Pile Co., Inc. of 205 East 42 Street, New York, N. Y.

I have been a superintendent for over twenty years, and have specialized experience in substructure work, including work on the Grand Coulee Dam.

The materials excavated from Pier 1–N at approximately elevation −21 were definitely of rock despite the fact that boring 1–NE classifies this material as fine white sand and clay mixed, and boring 1–NW, light gray sand, streaks of brown sand with some clay. This rock material extended to approximately elevation −26, and was in approximately 6″ to 12″ layers.

This material was again encountered at approximately elevation −37 and continued to below the originally proposed bottom of the cofferdam. Borings 1–NE & 1–NW however, would lead one to expect that we would encounter sand with traces of clay.

Because of this definite rock condition, it was physically impossible for us to excavate to the proposed bottom elevation. The Architect-Engineers representative recognized this fact, and permitted us to leave the bottom in certain areas considerably higher than those shown on the plans, because of our inability to excavate this material.

The only method which proved successful for the removal of this material between elevation −21 and −26 and again between elevation −37 to the bottom, was by a process of using a heavy jet pipe as a cutting and chipping tool, and also by using a heavy I-beam as a ram.

I have in my possession many samples of this material, each weighing several hundred pounds, which have been obtained from the material chopped out of this cofferdam.

Robert W. Briggs, a consulting engineer, was at the job site on several occasions and took representative samples of this rock as they were removed from the cofferdam, for test purposes.

From my long and varied experience, I know that the material excavated at these various elevations was not fine sand and clay mixed, nor brown sand with clay, but was definitely 6 inches to 1 foot layers of rock between sand strata.

/s/ Aaron Burros
January 30–1948

Expert testimony offered on behalf of appellant concerning the conditions encountered is as follows:

On the basis of our tests of samples from Pier 1–N, data from the borings at the elevations given above should be termed incorrect, and consequently, misleading information. Our tests show the materials at these elevations to be hard consolidated materials which must be definitely classed as rock. At elevation −60 Boring 1–NW indicates "Very hard, fine to medium brown sand" and shows 288 blows per foot on the sample spoon. This classification is very questionable. The material encountered was doubtless that of our Sample No. 2 which is classified as very hard sandstone.

The materials represented by our Samples Nos. 1 and 3 should have been classified as hard sandstone strata. They are not sand in any sense of the word. They occur in strong tough strata difficult to break and excavate without extensive chopping and drilling. The Borings have classified these materials as sand with the exception of about one foot of material in I–NW from −44 to −45 which they call "soft sandstone". Our studies of the material do not substantiate this classification.

Specific comments of the District Engineer concerning the samples referred to by appellant's geologist follow:

Sample No. 1.—The actual character of material excavated at and around elevation −21 is manifested by

the fact that it was all excavated by clamshell bucket and jetting. The material from the neighborhood of elevation −21 was observed by the District Engineer and Mr. Fehlhaber on 30 July 1947, and upon the District Engineer's return he saw fit to write into the files of this office: "I saw this material, and it is not rock. It broke into many fragments when dropped on the ground. There were, however, a few solid pieces."

SAMPLE No. 2.—Taken from an H beam which had been driven to elevation −60 and subsequently pulled. Accordingly, the exact elevation at which this sample existed is indeterminate. Sandstone was reported on the borings shown on the contract drawings at elevations −55 and −57. Bidders' attention was invited to the presence of a sandstone layer around elevations −55 and −57 in paragraph 3–08 (c) of the specifications as this was a layer which the Government presumed prior to the execution of the work would require special equipment to penetrate.

SAMPLE No. 3—Sample reported as being taken from between elevations −37 and −45. This sample was not representative of material between −37 and −45. It was noted in the Resident Engineer's report on 5 September 1947 and a field inspection by District personnel on 10 September 1947 that test specimens being selected were not representative of general run of material. It was further observed that the test specimens which were selected by the contractor were retrieved between elevations −42 and −45. Mr. Briggs points out the unusually high amount of cementing material in this specimen. This should be carefully noted. It is the cementing agent which gives the stone the property of aging or hardening as it dries out after being removed from its natural deposit. This explains the extraordinary increase in hardness of this material after removal from its natural deposit.

Testimony presented by expert Government geologist is summarized as follows:

1. The foundation materials in question were drilled and sampled by conventional open-tube sampling devices commonly used for sampling unconsolidated or partially consolidated stream and channel sediments. This condition is very apparent on the drawing exhibiting the boring records.

2. Careful study of the boring data indicates a wide variation in composition and degree of compaction for the various foundation materials. As pointed out during the hearing, rather than being unusual, this con-

dition is very characteristic of the channel sediments at the site of Pier 1–N. Notable differences of foundation conditions within small vertical and horizontal intervals is to be expected in cross-bedded estuarine sediments, and is illustrated effectively in the wide variation in the number of hammer blows per foot required to force the sampling pipe through the different sediments.

3. An outstanding weakness in the contractor's claim lies in the method of excavating the purported rock materials from the foundation intervals in question. Evidence presented by the Government indicated "excavation to approximate elevation −21 was made by use of clamshell bucket. Between elevations −21 and and −45 the assistance of a jet to loosen materials was employed." It was pointed out by the Government's geologist that such methods of excavation cannot be classified as rock excavation.

4. It is the opinion of the Government's geologist that while the original foundation borings were not presented to the greatest advantage in that they were not subjected to a geologist's inspection and logging, on the basis of the classification of materials presented in the contract drawings which are clear in emphasizing wide variations in compaction, no grounds for claiming changed conditions obtain.

With respect to the laboratory investigations conducted by the contractor's consultant, there is no inclination to dispute either the accuracy of the tests or geologic classification given by the consultant. However, the Government should have been given the opportunity to question the extent to which the materials tested were representative of conditions in the pier foundation. It was emphasized that the samples were taken in the absence of any Government inspection which would have permitted recording exact depths, elevations, thicknesses, saturated hardness, and similar information.

Further indication that the character of appellant's laboratory samples were not representative lies in the claim that an exact elevation could be given to a sample recovered from the flange of an H-beam driven to elevation −60. Obviously, a rock fragment so recovered after driving and retracting an H-beam through 20 feet of foundation could not be identified with any specific elevation, such as −60.

To the contractor's repeated contention that the drawings represented the foundations as "unconsolidated," it was pointed out that nowhere on the boring data sheet is the term "unconsolidated" used.

Upon careful consideration of the entire record and the evidence adduced at the hearing, it is the opinion of the Board that, although material excavated at Pier 1-N was harder and more expensive to excavate than appellant estimated from the borings furnished by the Government, the conditions did not vary materially from those represented by the borings and in the contract specifications. During the course of the work, the contractor failed to give written notice of changed conditions as required by Article 4 of the contract, but filed claim for additional compensation at or near the completion of the work. In a case decided by the Court of Claims on 1 November 1948 *Hallman Brothers* v. *United States*, the Court said:

> We think that the plaintiffs wholly failed to comply with the requirements of Article 4 as to calling the attention of the contracting officer to conditions asserted to have been unforeseen. The primary purpose of that provision of Article 4 is to induce a bidder not to include in his bid additional amounts to cover all possible, but improbable, events. But this purpose is safeguarded by the requirement that the Government's attention be promptly called to the claimed unforeseen condition, as such, so that an intelligent determination can be made as to whether it is unforeseen within the meaning of the contract, and how much extra expense it has caused. Here the plaintiffs, by withholding their claim until it was impossible to investigate it, obtained a findings of fact from the contracting officer based on guesswork, and seek a judgment from this court similarly based. We think, for this reason also, that the plaintiffs have no rights under Article 4.

For the foregoing reasons, the Board recommends that the appeal for additional compensation be denied. In view of this recommendation, it follows that appellant is not entitled to an extension of time of 115 days as claimed.

106. Plaintiff has withdrawn its claim for the removal of the Schaefer wharf, covered by paragraphs X through XII of its petition, and no findings of fact were requested with respect thereto.

107. The administrative findings of fact and decisions are contrary to the overwhelming weight of the evidence in this case, which clearly establishes that plaintiff encountered subsurface conditions at Pier 1-N, materially and substantially

different from those shown on the contract drawings, and the administrative decisions are not supported by substantial evidence.

CONCLUSION OF LAW

Upon the foregoing findings of fact, which are made a part of the judgment herein, the court concludes as a matter of law that plaintiff is entitled to recover for changed conditions encountered, and it is therefore adjudged and ordered that it recover of and from the United States the sum of fifty thousand, four hundred fourteen dollars and ninety cents ($50,414.90). Plaintiff is not entitled to a return of liquidated damages assessed against it by the defendant in the amount of $10,000.

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